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THE

AMERICAN BOTANIST

AND

FLORIST:

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INCLUDING LESSONS

IN THE

STRUCTURE, LIFE, AND GROWTH OF PLANTS;

TOGETHER WITH

A SIMPLE ANALYTICAL FLORA,

DESCRIPTIVE OF THE NATIVE AND CULTIVATED PLANTS
GROWING IN THE ATLANTIC DIVISION
OF THE AMERICAN UNION.

BY

ALPHONSO WOOD, A. M.,

AUTHOR OF THE CLASS-BOOK OF BOTANY, ETC.

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PREFACE.

In preparing the present work, it was our purpose to furnish the student in Botany with a complete manual within the compass of an ordinary duodecimo volume. To this end, we have revised the introductory treatise and recorded the principles of the Science in fewer words, occupying but two-thirds the space so used in the Class-Book. We have thus made room for the introduction of a series of *Synoptical Tables*—a feature entirely new—exhibiting the principles contained in the several chapters at a single glance, and in their combined relations. In the preparation of these tables we have received important aid from Prof. S. A. Norton, of Mount Auburn Seminary, Cincinnati. They are intended for the blackboard, and we are confident that both teacher and pupil will find them an essential aid both to the understanding and memory.

Our new Flora will be found a phenomenon in brevity. Within the space of 370 duodecimo pages, in fair leaded type, we have recorded and defined nearly 4,000 species—all the known Flowering and Fern-like plants, both native and cultivated (excepting alone the Sedges and Grasses), growing in the Atlantic half of the country. This conciseness has been attained, not by the omission of anything necessary to the complete definition and prompt recognition of every species, but simply by *avoiding repetitions.* In the *final* definition of the species (see, for example, *R. bulbosus*, the Bulbous Buttercup, p. 20) we give but one, two, three, rarely 4 lines. This cannot, of course, include its full portraiture. It includes only those few features which have not already been given elsewhere, and which *here* serve to distinguish the *R. bulbosus* from the two preceding species with which it stands grouped in the table. But the full portraiture of *R. bulbosus* (and of every species) will nevertheless be found in the Flora. Some of its features are given under its genus, Ranunculus; some under its Order; some under its Cohort; others under its Class, its Province, and its Sub-kingdom.

Moreover, all along the path of its analysis through the tables its characters are announced and recognized; so that if all the statements descriptive of *R. bulbosus* were collected, we should have nearly a half-page of text, and no important character left unnoticed.

Between the cultivated exotics and the wild native or naturalized species constituting our own flora, a distinction is made *in the type.* The names of the latter are expressed in full-face, **Roman** for the species, and ***Italic*** for the varieties. The names of the exotics are in SMALL CAPITALS.

The geographical limits of the present flora are the same as those adopted in the Class-Book; viz., all the States of the American Union lying east of the Mississippi River. This will necessarily include so many of the plants of the States bordering on the western shore of the Mississippi, that the book may be regarded as well adapted to those States also.

It gives me great pleasure to acknowledge my obligations to the friends whose names occur below and in many other parts of our work, for their contributions of new and rare plants, and for valuable information concerning them;—first, and especially, to Prof. THOS. C. PORTER, of Lafayette College; to E. L. HANKENSON, Newark, N.Y.; to JOHN WOLF, Canton, Ill.; to CHS. H. PECK, Albany, N. Y.; to WM. R. GIRARD, Esq., Poughkeepsie, N. Y.; to N. COLMAN, Iowa; to Rev. J. H. CARRUTH, Kansas; to Dr. W. MATTHEWS, Dakota; to H. MAPES, Michigan, &c., &c.

And as a just tribute to the memory of my LAMENTED WIFE, I would add that whatever is new and peculiar in the plan of the present Flora, that on which its definite conciseness depends, *is due to her alone.* She first indicated the method, and for years assiduously advocated its adoption.

CUJUS NOMINI AC MEMORIÆ CARISSIMÆ,

HOC OPUS, IN MEDIO DOLORE AC DESIDERIO CONFECTUM,

DEDICAT CONJUX.

TABLE OF CONTENTS:

TOGETHER WITH A *SYLLABUS* OF THE MORE PRACTICAL SUBJECTS, DESIGNED AS EXERCISES ON THE BLACKBOARD, PRELIMINARY TO THE LESSONS.

N. B.—We give the Syllabus of but a few Chapters, and of fewer entire, in order that the pupil may exercise his own skill in supplying the deficiencies. The teacher should require this. The abbreviation (&c.) indicates a table unfinished.

INTRODUCTION........................Page 9
CHAPTER I. Aids to the Study of Botany........................ 9
CHAPTER II. Departments of Science........................ 11

* Existence, individually; (§ 13)
a As an inorganic mass, is........................A Mineral.
b As an organic body,—endowed with life........................A Plant.
—endowed with life and perception........An Animal.
* Existence, collectively, Nature. (§ 12), &c.
* Existence, objectively, Science. (§ 16–18), &c.
* Departments of Botany. (§ 19–23), &c.
* Classification. (§ 27–30), &c.
* Nomenclature. (§ 25, 26)
a Local appellatives in common use........................Trivial Names.
b Universal appellatives adopted in Science..................Latin Names.
—The name of the Genus..................Generic.
—The name of the Species..................Specific.
—The name of the Individual..................Proper.

CHAPTER III. Stages of Plant Life........................ 14

First Stage; asleep in the Seed........................Embryo.
Second Stage; development.—*a* Awakening and beginning to grow..Germination.
—*b* Developing leaves and branches......Vegetation.
Third Stage; leaves transformed to flowers..................Flowering.
Fourth Stage; maturity.—*c* Flowers maturing into fruit...........Fructification.
—*d* Fruit ripe and the plant exhausted. Hybernation. Death.

CHAPTER IV. Term of Plant Life........................ 16

§ Plant fruiting but once, and—*a* dying in its first year..........① Annual Herb.
—*b* dying after its second year....② Biennial Herb.
—*c* dying after many years............Monocarpic.
§ Plant fruiting more than once (perennial),
a With annual stems, is a ....♃ Perennial Herb.
b With perennial stems becoming woody.
1, If lower than or equalling the human stature..............Undershrub.
2, If taller, 7 to 20 feet high........................Shrub.
3, If still taller, with a distinct trunk........................A Tree.
† Trees with annual foliage, shed in Autumn...............Deciduous
† Trees with perennial foliage........................Evergreen

PART FIRST.—STRUCTURAL BOTANY, OR ORGANOGRAPHY.................. 19
CHAPTER I. The Flower. It may consist of,.. 19
a The leafy Envelopes, or Perianth, in 2 whorls or sets.
1, The outer circle, of Sepals, usually green .... Calyx.
2, The inner circle, of Petals, usually colored ....Corolla.
b. The Essential Organs, also in 2 whorls or sets.
3, An outer set, of Stamens, within the corolla..................Andrœcium.
4, The inner and central set, of Pistils............................Gynœcium.
c The base, or platform on which these organs stand.......................Torus.
CHAPTER II. Plan of the Flower.—The Typical Flower, ... 21
1, Consisting of 4 whorled sets of organs, is...............................Complete.
2, Each set having the same number of parts.......................Symmetrical.
3, The parts composing each set uniform.....................................Regular.
4, All the parts separate and distinct from each other...............................Free.
5, Parts of adjacent sets alternating in position...............................Alternate.
CHAPTERS III. and IV. Anomalous Flowers. Deviations from the Type.......... 23
1, Variations in the Radical Number...........................From ✓ to ✓.
2, Deficiencies, rendering the flower
a Incomplete.—Corolla wanting...Apetalous.
—Corolla and calyx both wanting.. ....Naked.
b Imperfect.—The stamens wanting................................ ♀ Pistillate.
—The pistils wanting................................ ♂ Staminate.
c Unsymmetrical, from the suppression of a part of some set.
d Organs opposite, from the suppression of some entire set.
3, Redundancies.
a Organs increased in number,—by multiples..................Multiplication.
—by clusters...............................Chorisis.
b Appendages.—Horn-like nectaries projecting backward..............Spurs.
—Attached to the inside of the petals...............Scales.
—Enlarged scales....................................Crown.
—Glandular bodies......................................Glands.
4, Union of Parts.
a By Cohesion.—Petals united..........Gamopetalous, or Monopetalous.
—Stamens united...........................Monadelphous.
—Pistils united.................................Compound.
b By Adhesion.—Parts blended with the Calyx...............Perigynous.
—Parts blended with the Ovary...............Epigynous.
5, Irregularities.—Torus lengthened, excavated, &c.
—Like organs, becoming unequal in size, &c.
CHAPTER V. Of the Floral Envelopes, or Perianth 30
CHAPTER VI. Forms of the Perianth.. 34
1, Dialypetalous, or Polypetalous.
* Regular.—*a* Four long-clawed petals spreading at right-angles..Cruciferous.
—*b* Five short-clawed spreading petals.................Rosaceous.
—*c* Five spreading petals on long erect claws....Caryophyllaceous.
—*d* A 6-leaved gradually spreading perianth............Liliaceous.
* Irregular.—*e* Five petals, 2 pairs and an odd one............Papilionaceous.
—*f* Six petals, one of them lip-like.............. ...Orchidaceous.
2, Gamopetalous, or Monopetalous. (§ 102)
* Regular.—*a* Tube very short, border flat, spreading.................Rotate.
—*b* Tube very short, border wide, concave, Cup-form, &c., &c.
* Irregular.—*c* Cylindrical tube split down, &c. (§ 103)
§ Transformations of the Perianth. (§ 104–108)
1, In the Compositæ. A circle of dry scales or bristles...................Pappus
2, In the Bog-Rushes. A circle of 6 (more or less) bristles.......... ......Setæ.

3, In the Sedges (Carices). A bottle-shaped envelope..............,Perigynium.
4, In the Grasses. Chaff-like coverings..........................Glunus, and Pales.
CHAPTER VII. Attributes of the Essential Organs.—Parts 39
1, In respect to Number.—*a* &c. (§ 118, two conditions.)
2, In position.—*a* On the torus, free from all other organs.... ......Hypogynous,
—*b* Adherent to the calyx, &c. (§ 119, four other conditions.)
3, In cohesions.—*a* United into one set, &c. (§ 120, five modes.)
CHAPTER VIII. The Pistils.—Its Parts (§ 125).. 43
1, The simple ovary,—*a* encloses a single cavity............................Its Cell.
—*b* produces little buds becoming seeds.............Ovules.
—*c* and two fleshy ridges bearing the ovules.......Placentæ.
2, The compound ovary—*a* may contain as many cells as carpels.
—*b* must have 2 (or a double) placentæ in each cell.
—*c* and an equal number of ovules in each cell.
3, The number of carpels in a compound ovary is known—
1, By the number of distinct styles, if any
2, By the number of distinct stigmas.
3, By the number of the cells; or if there be but one,
4, By the number of external lobes, angles, or sutures.
CHAPTER IX. The Ovules.. 48
CHAPTER X. The Fruit.—Pericarp.—Dehiscence.. 50
CHAPTER XI. Forms of the Pericarp. (See Syllabus, § 150).................... 53
CHAPTER XII. The Seed 58
CHAPTER XIII. Germination.. 62
CHAPTER XIV. The Root, or Descending Axis.—Forms................................ 66
* Axial Roots, or Tap Roots, having the main axis developed.
1, The woody tap-root of most trees, branching.......................Ramous.
2, Tuberous tap-roots.—*a* Shaped like a spindle (Beet).............Fusiform.
—*b* Shaped like a cone (Carrot)................Conical.
—*c* Shape rounded or depressed (Turnip)....Napiform.
* Inaxial Roots, having only the branches developed.
3, Root consisting of numerous thread-like divisions................Fibrous.
4, Root fibro-tuberous.—*a* Some of the fibres thickened..........Fasciculate.
—*b* Fibres abruptly knotted ....Nodulous.
—*c* The knots at regular intervals.........Moniliform.
—*d* Fibres bearing little tubers............Tubercular.
CHAPTER XV. Of the Stem, or Ascending Axis.. 71
CHAPTER XVI. Forms of the Leaf-Stems, aerial, caulescent........................ 75
1, Jointed, or hollow stems of Grasses, Sedges, Canes.......................Culm.
2, The stout woody stem of Trees, covered with bark.........................Trunk.
3, The woody, simple columns of Palms, &c., without bark..............Caudex.
4, Weak, slender stems, climbing or trailing.....................................Vine.
CHAPTER XVII. Forms of Scale-Stems, acaulescent.................................. 78
1, Slender, prostrate, rooting, on or in the ground........................Creeper.
2, Fleshy, thick, rooting, mostly under ground.............................Rhizome.
3, Swollen with starch, under ground, with buds (eyes)..................Tuber.
4, Bulbous, solid, with thin scales, under ground...............................Corm.
5, Bulbous, consisting mostly of thick scales ....Bulb.
CHAPTER XVIII. The Leaf-Bud. Vernation (and Æstivation, Chap. XXIV)...... 82
* Separate; regarding a single leaf (petal or sepal) in bud.
1, Leaf flat, neither folded nor rolled in the bud...............................Open.
2, Bent forward, apex toward the base...Reclined.
3, Folded on the axis..Conduplicate.
4, Folded in plaits like a fan..Plicate.
5, Rolled *on* its axis downward ....Circinate.

6, Rolled *with* its axis,—*a* from one edge into a scroll............Convolute.
—*b* from both edges inward..................Involute.
—*c* from both edges backward..............Revolute.
* General;—regarding the whole bud.
1, Edges meeting, Valvate,—with the margins straight...............Valvate.
—with the margins involute..........Induplicate.
—with the margins revolute..........Reduplicate.
2, One edge overlapping, each leaf oblique............Twisted or Contorted.
3, Both edges overlapping, Imbricate.
a Conduplicate leaves, alternately—embracing..............Equitant.
—half embracing.........Obvolute.
b Leaves in threes, one of them exterior...............Triquetrous.
c Leaves in fives, two of them exterior..................Quincuncial.
d Each leaf or petal embracing all those within............Convolute.
e Exterior petal largest (Sweet Pea)........................Vexillary.
4, Gamopetalous corolla folded in plaits,—plaits straight.............Plicate.
—plaits oblique..........Supervolute.
CHAPTER XIX. Of the Leaf.—Phyllotaxy.................................... 87
CHAPTER XX. Morphology of the Leaf.—§ Venation............................ 91
1, Veins simple and parallel, as in the Endogens...............Parallel-veined.
2, Veins dividing without uniting again, as in Ferns................Fork-veined.
3, Veins *netted*, as in the Exogens, viz.:
a Larger veins arranged as in a feather.........................Pinni-veined.
b Larger veins 5 to 9, arranged as the fingers..............Palmi-veined.
c Larger veins only 3, arranged as the fingers..............Triple-veined.
§ Special Veins.
1, In feather-veined leaves,—the chief vein forming the axis...........Mid-vein.
—lateral branches of the mid-vein...........Veinlets.
—the branches of the veinlets.............Veinulets.
2, In palmi-veined leaves, or triple-veined;—
a The coequal veins running through the blade, are...............Veins.
b The branches of the veins, are (as in feather-veined)..........Veinlets.
CHAPTER XXI. Forms of Leaves. (Morphology, continued)...................... 95
* Pinni-veined Leaves.
a Lower veinlets longer than the upper.
1, Outline of an egg...Ovate.
2, Outline of a lance, or narrow-ovate........................Lanceolate.
3, Form of the Greek letter △.......................................Deltoid.
b The middle veinlets longest, lower and upper equal.
4, Circular, or nearly so.......................................Orbicular.
5, Outline of an elliptic spring.................................Elliptical.
6, Egg-shaped, with equal rounded ends..............................Oval.
7, Narrowly oval, with obtuse ends...............................Oblong.
c The upper veinlets longest.
8, Inversely ovate, narrower at the base..........................Obovate.
9, Inversely lanceolate, narrower at the base...............Oblanceolate.
10, Obtuse at apex, narrowed to the base.......................Spatulate.
11, Shaped like a wedge, the point at base.......................Cuneate.
d Lowest veinlets longest and recurved.
12, A re-entering angle, or sinus, at base. Heart-shaped.........Cordate.
13, Base-lobes ear-shaped....................................Auriculate.
14, Base-lobes arrow-shaped.....................................Sagittate.
15, Base-lobes turned outward....................................Hastate.
* Dissected Forms.
a Pinnately cut or divided.

1, With regular lateral segments .... Pinnatifid.
2, With segments recurved or hooked .... Runcinate.
3, Terminal segment enlarged .... Lyrate.
4, Segments many and narrow .... Pinnatisect.
5, Segments and sinuses rounded .... Sinuate.
b Palmately cut or lobed:
6, Lobes only 3 .... Trilobate.
7, Lobes 5 or more .... Palmately-lobed.
8, Lobes deeply divided .... Palmately-parted.
9, Side-lobes again 2-lobed .... Pedate.
CHAPTER XXII. Forms of Compound Leaves.
* Pinnately compound.
a Once compounded, consisting of—
1, Two leaflets opposite and equal .... Binate.
2, Three leaflets, the odd one petiolulate .... Pinnately-trifoliate.
3, Four or more equal leaflets, all in pairs .... Equally pinnate.
4, Five or more equal leaflets, all but one in pairs .... Odd-pinnate.
5, Alternate leaflets smaller .... Interruptedly pinnate.
b Twice compounded, consisting of—
6, Nine leaflets (or 3 trifoliate leaves) .... Biternate.
7, Fifteen or more leaflets (3 pinnate leaves) .... Bipinnate.
c Thrice compounded, having 27 leaflets .... Triternate, &c.
d Irregularly much compounded .... Decompound.
* Palmately compounded, consisting of—
10, Three equal leaflets all alike sessile (Clover) .... Palmi-trifoliate.
11, Five or 7 leaflets, all equally sessile .... Digitate.
CHAPTER XXIII. Transformations of the Leaf 106
CHAPTER XXIV. Metamorphosis of the Flower. (See Chap. XVIII) 110
CHAPTER XXV. Inflorescence.—Special Forms 114
§ Evolution.—*a* One flower only from a bud .... Solitary.
—*b* From axillary buds, the lowest first opening .... Centripetal.
—*c* From terminal buds, the central first .... Centrifugal.
§ Special Forms of Inflorescence.
* Centripetal, or Indefinite.
a Flowers sessile—1, along a slender rachis .... Spike.
—2, along a thick fleshy rachis .... Spadix.
—3, on an extremely short rachis .... Head.
—4, Spike of imperfect fls. caducous together ... Ament.
b Flowers borne on pedicels.
5, Along the sides of a lengthened rachis .... Raceme.
6, Along a short rachis, the lower pedicels lengthened .... Corymb.
7, Clustered on an extremely short rachis .... Umbel.
c The pedicels themselves branched,—8 loosely .... Panicle.
—9 compactly .... Thyrse.
* Centrifugal, or Definite.
1, Clusters open, loose, of various forms .... Cyme.
2, Clusters compact, terminal .... Fascicle.
3, Clusters compact, axillary and opposite .... Verticils.
4, Cyme unilateral, unrolling as it develops .... Scorpoid Raceme.

PART SECOND.—PHYSIOLOGICAL BOTANY 123

CHAPTER I. Of the Vegetable Cell 123
CHAPTER II. Of the Vegetable Tissues 127
CHAPTER III. The Epidermal System 130
CHAPTER IV. The Ligneous System 132

Chapter V. The Ligneous System, continued 137
Chapter VI. Vegetation, or the Physiology of Plant Life 140
Chapter VII. Fertilization 142
Chapter VIII. Absorption; 145
  * By the root.
    a The root absorbs inorganic matter, from the soil, viz.—1, Water.
      —2, Carbon.
      —3, Mineral Salts.
    b The rt. absorbs organic matter, from mould & refuse.—1, Nitrates.
      —2, Ammonia.
  * By the green parts, from the Atmosphere, viz..........—1, Water.
      —2, Oxygen.
      —3, Carbonic Acid.
      —4, Ammonia.
Chapter IX. Circulation; 147
  * Of the Crude Sap, upward through the wood,—To the Leaves.
  * Of the True Sap, returning, downward,—*a* to the incipient leaves.
      —*b* to the cambium layer.
      —*c* to the medullary rays.
      —*d* to the roots.
Chapter X. Transpiration and Respiration 149
  * Transpiration through the Stomata, of..........—Water.
  * Respiration,
    1, In the Green Parts,—*a* in the sunshine .... Absorbing CO_2.
      Retaining C.
      Exhaling O.
      —*b* in darkness..........—Absorbing O.
      —Consuming C.
      —Exhaling CO_2.
    2, In the roots, flowers, &c., at all times ....—Absorbing O.
      —Consuming C.
      —Exhaling CO_2.

PART THIRD.—SYSTEMATIC BOTANY 153
Chapter I. General Principles of Classification 153
Chapter II. The Natural System 155
Chapter III. Botanical Analysis 160
Chapter IV. Rules for Nomenclature 163

INDEX AND GLOSSARY 165

INTRODUCTION.

CHAPTER I.

AIDS TO THE STUDY OF BOTANY.

1. **The proper season** for the commencement of the study of Botany in schools, is late in winter, at the opening of the first session after New-Year's. The class will thus be prepared beforehand, by a degree of acquaintance with first principles, for the analysis of the earliest Spring-flowers—the Blood-root, Liverwort, Spring-beauty, Sweet Mayflower, Erigenìa, and the Violets. We have arranged the topics of the present treatise with a special view to the convenience of the learner in this respect, beginning with that which is the first requisite in analysis—the Flower.

2. **Specimens** of leaves, stems, roots, fruit, flowers, etc., in unlimited supply are requisite during the whole course. In the absence of the living, let the dried specimens of the herbarium be consulted. Crayon sketches upon the blackboard, if truthful, are always good for displaying minute or obscure forms. In the city, classes in Botany may employ, at small expense, a collector to supply them daily with fresh specimens from the country. Moreover, the gardens and conservatories will furnish to such, an abundant supply of *cultivated* species for study and analysis, with almost equal advantage,—since the present work embraces, together with the native flora, all exotics which are in any degree common in cultivation.

3. **An Herbarium** (Latin, *hortus siccus*, or *h. s.*) is a collection of botanic specimens, artificially dried, protected in papers, and systematically arranged. *Herbaria are useful in many ways;*—(*a*) for preserving the knowledge of rare, or inaccessible, or lost species; (*b*) for exchanges, enabling one to possess the flora of other countries; (*c*) for refreshing one's memory of early scenes and studies; (*d*) for aiding in more

exact researches at leisure; (*e*) for the comparison of species with species, genus with genus, etc.

4. **Apparatus.** For collecting botanic specimens, a strong knife for digging and cutting is needed, and a close tin box, fifteen inches in length, of a portable form. Enclosed in such a box, with a little moisture, specimens will remain fresh a week.

5. Specimens for the herbarium should represent the leaves, flowers, and fruit—and, if herbaceous, the root also. Much care is requisite in so drying them as to preserve the natural appearance, form, and color. The true secret of this art consists in extracting the moisture from them before decomposition can take place.

6. **The drying-press,** to be most efficient and convenient, should consist of a dozen quires of unsized paper, at least 11 × 14 inches folio; two sheets of wire-gauze (same size) as covers, stiffened by folded edges; and three or four leather straps a yard in length, with buckles. When in use, suspend this press in the wind and sunshine; or, in rainy weather, by the fire. In such circumstances, specimens dry well without once changing. But if boards be used instead of wire-gauze, the papers must be changed and dried daily. Succulent plants may be immersed in boiling water before pressing, to hasten their desiccation.

7. **The lens,** either single, double, or triple, is almost indispensable in analysis. In viewing minute flowers, or parts of flowers, its use cannot be too highly appreciated. Together with the lens, a needle inserted in a handle, a penknife, and tweezers are required for dissection.

8. The compound microscope is undoubtedly a higher aid in scientific investigation than any other instrument of human invention. It is like the bestowment of a new sense, or the opening of a new world. Through this, almost solely, all our knowledge of the cells, the tissues, growth, fertilization, etc., is derived. The skilful use of this noble instrument is itself an art, which it is no part of our plan to explain. For such information the student is referred to the works of Carpenter and Quekett.

9. On the preparation of botanical subjects for examination we remark briefly. The field of view is necessarily small, and only minute portions of objects can be seen at once. The parts are to be brought under inspection successively by the movements of the stage.

10. The tissues of leaves, etc., are best seen by transmitted light. They are to be divided by the razor or scalpel into extremely thin parings or cuttings. Such cuttings may be made by holding the leaf between the two halves of a split cork. They are then made wet and viewed upon glass. The stomata are best seen in the epidermis stripped off; but in the Sorrel-leaf (Oxalis violacea) they appear beautifully distinct upon the entire leaf. (§ 397, Fig. 497.)

11. Woody tissues, etc., may be viewed either as opaque or transparent. Sections and cuttings should be made in all directions, and attached to the glass by water, white of egg, or Canada balsam. To obtain the elementary cells separately for inspection, the fragment of wood may be macerated in a few drops of nitric acid added to a grain of chlorate of potassa. Softer structures may be macerated simply in boiling water.

Review of the Chapter.—1. Advantage of beginning the study in early spring. 2. Specimens for illustration. How to obtain them in the city. 3. The herbarium. Uses of it. 4. Apparatus for collecting. 5. Good specimens. Secret of preparing them. 6. The drying-press. 7. The use of lenses. 8. Of the microscope, etc.

CHAPTER II.

DEPARTMENTS OF SCIENCE.

12. Three great departments in nature are universally recognized, commonly called the mineral, vegetable, and animal kingdoms. The first constitutes the *Inorganic*, the other two the *Organic World.*

13. A mineral is an *inorganic* mass of matter—that is, without distinction of parts or organs. A stone, for example, may be broken into any number of fragments, each of which will retain all the essential characteristics of the original body, so that each fragment will still be a stone.

14. A plant is an *organized* body, endowed with vitality but not with sensation, composed of distinct parts, each of which is essential to the completeness of its being. A Tulip is composed of organs which may be separated and subdivided indefinitely, but no one of the fragments alone will be a complete plant.

15. Animals, like plants, are organized bodies endowed with vitality, and composed of distinct parts, no one of which is complete in itself; but they are elevated above either plants or minerals by their power of perception.

16. Physics is the general name of the science which treats of the mineral or inorganic world.

17. Zoölogy relates to the animal kingdom.

18. **Botany** is the science of the vegetable kingdom. It includes the knowledge of the forms, organs, structure, growth, and uses of plants, together with their history and classification. Its several departments correspond to the various subjects to which they relate. Thus,

19. *Structural Botany*, or Organography, treats of the special organs of plants as compared with each other, answering to Comparative Anatomy in the science of Zoology. Morphology is a term often used in a similar sense; but it especially relates to the mutual or typical transformations which the organs undergo in the course of development.

20. *Elementary Botany* treats of the elementary tissues—the organic elements out of which the vegetable fabric is constructed.

21. *Physiological Botany* is that department which relates to the vital action of the several organs and tissues, including both the vital and chemical phenomena in the germination, growth, and reproduction of plants. It has, therefore, a direct and practical bearing upon the labors of husbandry in the propagation and culture of plants, both in the garden and in the field.

22. *Systematic Botany* arises from the consideration of plants in relation to each other. It aims to arrange and classify plants into groups and families, according to their mutual affinities and relative rank, so as to constitute of them all one unbroken series or system.

23. *Descriptive Botany*, or Phytology, is the art of expressing the distinctive characters of species and groups of plants with accuracy and precision, in order to their complete recognition. A *Flora* is a descriptive work of this kind, embracing the plants of some particular country or district.

24. Finally, in its extended sense, Botany comprehends also the knowledge of the relations of plants to the other departments of nature—particularly to mankind. The ultimate aim of its researches is the development of the boundless resources of the vegetable kingdom, for our sustenance and protection as well as education: for the healing of our diseases and the alleviation of our wants and woes. This branch of botanical science is called *Applied Botany*, including several departments—as Medical Botany, or Pharmacy; Agricultural Botany, or Chemistry; Pomology, etc.

25. The name of a plant or other natural object is twofold,—the trivial or popular name, by which it is generally known in the country; and the Latin name, by which it is accurately

designated in science throughout the world. For example, *Strawberry* is the popular name, and *Fragaria vesca* the Latin or scientific name, of the same plant. In elementary treatises, like the present, for the sake of being readily understood, plants are usually called by their popular names. Yet we earnestly recommend the learner to accustom himself early to the use of the more accurate names employed in science.

26. The Latin name of a plant is always double—generic and specific. Thus *Fragaria* is generic, or the name of the *genus* of the plant—*vesca* is specific, or the name of the *species.*

27. **A Species** embraces all such individuals as may have originated from a common stock. Such individuals bear an essential resemblance to each other as well as to their common parent, in all their parts. For example, the White Clover (Trifolium repens) is a species embracing thousands of contemporary individuals scattered over our hills and plains, all of common descent, and producing other individuals of their own kind from their seed.

28. To this law of resemblance in plants of one common origin there are some apparent exceptions. Individuals descended from the same parent often bear flowers differing in color, or fruit differing in flavor, or leaves differing in form, etc. Such plants are called *Varieties.* They are never permanent, but exhibit a constant tendency to revert to their original type. Varieties occur chiefly in species maintained by cultivation, as the Apple, Potato, Rose, Dahlia. They also occur more or less in native plants (as Hepatica triloba), often rendering the limits of the species extremely doubtful. They are due to the different circumstances of climate, soil, and culture to which they are subjected, and continue distinct only until left again to multiply spontaneously from seed in their own proper soil, or some other change of circumstances.

29. **A Genus** is an assemblage of species closely related to each other in the structure of their flowers and fruit, and having more points of resemblance than of difference throughout. Thus, the genus Clover (Trifolium) includes many species, as the White Clover (T. repens), the Red Clover (T. pratense), the Buffalo Clover (T. reflexum), etc., agreeing in floral structure and gen-

eral aspect so obviously that the most hasty observer would notice their relationship. So in the genus Pinus, no one would hesitate to include the White Pine, the Pitch Pine, the Long-leafed Pine (P. strobus, rigida, and palustris), any more than we would fail to observe their differences.

30. Thus individuals are grouped into species, and species are associated into genera. These groups constitute the bases of all the systems of classification in use, whether by artificial or natural methods.

Review.—12. Three Kingdoms of Nature? 13. A mineral? Illustrate. 14. A plant? Illustrate. 15. An animal? 16. Define Physics. 17. Zoology. 18. Define Botany. 19. Organography, Morphology. 20. Elementary Botany. 21. Physiological Botany. 22. Systematic Botany. 23. Phytology. 24. Applied Botany. 25. Names. 26. Latin names. 27. A Species. Illustrate. 28. Varieties. 29. What is a Genus?

CHAPTER III.

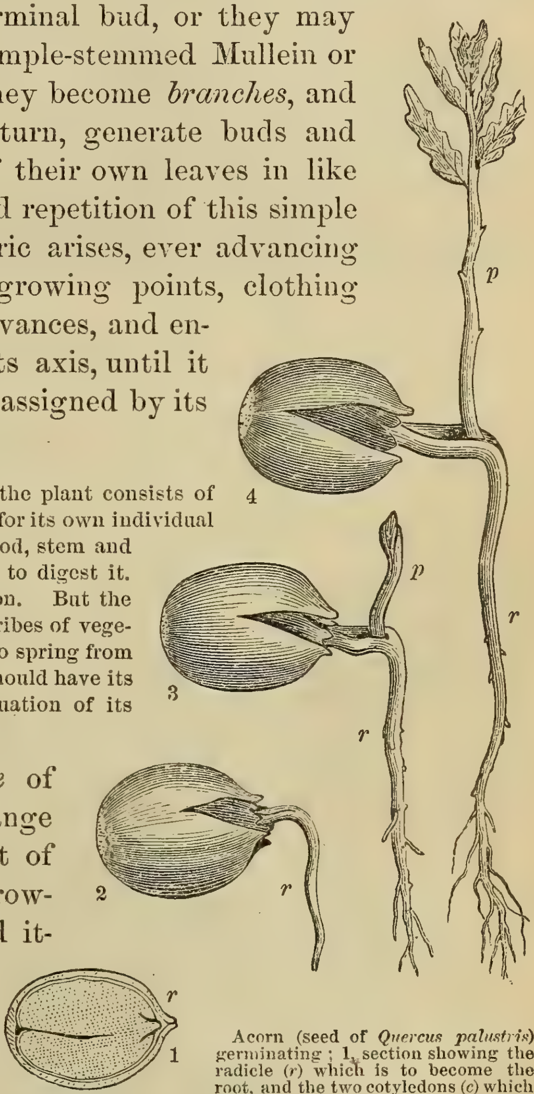
THE FOUR STAGES OF PLANT LIFE.

31. In its *earliest stage of life*, the plant is an *embryo* sleeping in the seed. It then consists of two parts, the *radicle* or rootlet, and the *plumule.* Both may be seen in the Pea, Bean, or Acorn. Besides the embryo, the seed contains also its food in some form, provided for its first nourishment.

32. At length the genial warmth and moisture of the Spring awakens the embryo, and it begins to feed and grow. The radicle protrudes the slender rootlet (fig. 2, *r*), which turns downward, seeking the dark damp earth, avoiding the air and light, and forms the root or *descending axis.* The plumule, taking the opposite direction (fig. 3, *p*), ascends, seeking the air and light, and expanding itself to their influence. This constitutes the stem or *ascending axis*, bearing the leaves. Thus the acorn *germinates*, and the Oak enters upon the *second stage* of its existence.

33. At first the ascending axis is merely *a bud*, that is, a growing point clothed with and protected by little scales, the rudiments of leaves. As the growing point advances and its lower scales gradually expand into leaves, new scales successively appear above. Thus the axis is always terminated by a bud.

34. By the growth of the terminal bud, the axis is simply lengthened in one direction, an undivided stem. But besides this, buds also exist, ready formed, in the axils of the leaves, one in each. These axillary buds, a part or all of them, may grow and develop like the terminal bud, or they may always sleep, as in the simple-stemmed Mullein or Palm. But in growing they become *branches*, and these branches may, in turn, generate buds and *branchlets* in the axils of their own leaves in like manner. By the continued repetition of this simple process, the vegetable fabric arises, ever advancing in the direction of the growing points, clothing itself with leaves as it advances, and enlarging the volume of its axis, until it reaches the limit of being assigned by its Creator.



Acorn (seed of *Quercus palustris*) germinating; 1, section showing the radicle (*r*) which is to become the root, and the two cotyledons (*c*) which are to nourish it; 2, the radicle *r*, descending; 3 and 4, the radicle, *r*, descending, and the plumule (*p*) ascending.

35. Reared by this process alone, the plant consists of such organs only as were designed for its own individual nourishment—roots to absorb its food, stem and branches to transmit it, and leaves to digest it. These are called organs of nutrition. But the divine command which caused the tribes of vegetation in their diversified beauty to spring from the earth, required that each plant should have its "seed within itself" for the perpetuation of its kind. (See. 1; 11.)

36. In the *third stage* of vegetation, therefore, a change occurs in the development of some of the buds. The growing point ceases to extend itself as hitherto, and still remains a point, expanding its scales in crowded whorls, each successive whorl undergoing a gradual transformation, departing more and more from the original type—the leaf. Thus, instead of a *leafy branch*, the ordinary product of the bud, a *flower* is the result.

37. Hence a flower may be considered as a transformed branch,

having the leaves crowded together by the non-development of the axis, moulded into more delicate forms and tinged with more brilliant hues, not only to adorn the face of nature, but to fulfil the important office of reproduction.

38. Lastly comes fruit-bearing, *the fourth stage* of plant life, for which the flower has prepared the way. The work and bloom of the flower are soon accomplished, its deciduous parts fall, and the remaining energies of the plant are directed to the development of the *pistil* into the perfect *fruit.*

Review.—31. First stage of plant life. Contents of a seed. 32. Second stage. Tendency of the radicle.—Of the plumule. 33. Structure of the first bud. How does it grow? 34. What it develops? Other buds. Whence the branches arise. 36. Origin of the flower. 37. What then is its nature? 38. Fourth stage.

CHAPTER IV.

TERM OR PERIOD OF PLANT LIFE.

39. Flowering and fruit-bearing is an exhausting process. If it occur within the first or second year of the life of the plant, it generally proves the fatal event. In all other cases it is either immediately preceded or followed by a state of needful repose. Now if flowering be prevented by nipping the buds, the tender annual may become perennial, as in the florist's Tree-mignonette.

40. We distinguish plants, as to their term of life, into the annual (①), the biennial (②), and the perennial (♃). *An annual* (①) herb is a plant whose entire life is limited to a single season. It germinates from the seed in Spring, attains its growth, blossoms, bears fruit, and dies in Autumn; as the Flax, Corn, Morning-glory.

41. *A biennial herb* (②) is a plant which germinates and vegetates, bearing leaves only the first season, blossoms, bears fruit, and dies the second; as the Beet and Turnip. Wheat, Rye, etc., are annual plants; but when sown in Autumn they have the habit of biennials, in consequence of the prevention of flowering by the sudden cold.

42. *Monocarpic herbs.* The Century-plant (Agave), the Talipot-palm, etc., are so called. They vegetate, bearing leaves only, for many years, accumulating materials and strength for one mighty effort in fructification, which being accomplished, they die. In some species the term of life depends on *climate* alone. The Castor-bean (Ricinus) is an annual herb in the Northern States, a shrub in the Southern, and a tree of large size in its native India. So Petunia, annual in our gardens, is perennial at home (in Brazil).

43. **Perennial plants** are such as have an indefinite duration of life, usually of many years. They may be either herbaceous or woody. Herbaceous perennials, or *perennial herbs* (♃), are plants whose parts are annual above ground and perennial below. In other words, their roots or subterranean stems live from year to year, sending up annually, in Spring, flowering shoots which perish after they have ripened their fruit in Autumn; as the Lily, Dandelion, Hop.

44. *Woody perennials* usually vegetate several years, and attain well-nigh their ordinary stature before flowering; thenceforward they fructify annually, resting or sleeping in winter. They are known as trees (♄), shrubs (♄), bushes, and undershrubs (♭)—distinctions founded on size alone.

45. A *shrub* (♄) is a diminutive tree, limited to eighteen or twenty feet in stature, and generally dividing into branches at or near the surface of the ground (Alder, Quince). If the woody plant be limited to a still lower growth, say about the human stature, it is called a bush (Snowball, Andromeda). If still smaller, it is an undershrub (♭) (Whortleberry).

46. A *tree* (♄) is understood to attain to a height many times greater than the human stature, with a permanent woody stem, whose lower part, the trunk, is unbranched.

47. As to age, some trees live only a few years, rapidly attaining their growth and rapidly decaying, as the Peach; others have a longevity exceeding the age of man; and some species outlive many generations. Age may be estimated by the number of wood-circles or rings seen in a cross-section of the trunk (§ 408), each ring being (very generally) an annual growth. Instances of great longevity are on record. See Class Book of Botany, §§ 99, 100. The monarch tree of the world is that Californian Cedar—Sequoya gigantéa. One which had fallen measured 26 feet in diameter, and 363 in length! The wood-circles of this specimen are unusually thick, yet count up to 1,330 years. Among those yet standing (A. D. 1866), are many of even greater dimensions, as beautiful in form as they are sublime in height—the growth, probably, of more than 2,000 years.

48. Trees are again distinguished as *deciduous* (♄) and *evergreen* (♄)—the former losing their foliage in Autumn, and remaining naked until the following Spring; the latter retaining

their leaves and verdure throughout all seasons. The Fir tribe (Coniferæ) includes nearly all the evergreens of the North: those of the South are far more numerous in kind—*e. g.*, the Magnolias, the Live-oaks, Holly, Cherry, Palmetto, etc.

Review.—39. What of flowering and fruiting? When do they prove fatal? An experiment. 40. Define an annual herb. 41. A biennial herb. 42. Monocarpic herbs. What of the Castor-bean? 43. Perennial plants. Herbaceous perennials. 44. Woody perennials. 45. Shrub. Bush. Undershrub. 46. A tree. 47. The age of trees. How ascertained. The "monarch" of trees. Relate its age and dimensions. 48. Distinctions in reference to verdure.

PART FIRST.

STRUCTURAL BOTANY; OR, ORGANOGRAPHY.

CHAPTER I.

THE FLOWER.

49. **The flower** is the immediate agent in the production of the seed with its embryo, and to this end its whole structure is designed. Moreover, its superior beauty attracts earliest attention, and an intimate knowledge of its organism is the *first* requisite in analysis and classification.

50. The flower may consist of the following members—the floral envelopes and the essential floral organs. *The floral envelopes* consist of one or more circles or *whorls* of leaves surrounding the essential organs. The outer of these whorls is called the *calyx;* and the other, if there be any, the *corolla.* The calyx may, therefore, exist without the corolla; but the corolla cannot exist without the calyx.

51. **Calyx** is a Greek word signifying a cup. It is applied to the external envelope of the flower, consisting of a whorl of leaves with their edges distinct or united, usually green, but sometimes highly colored. The leaves or pieces composing the calyx are called *sepals.*

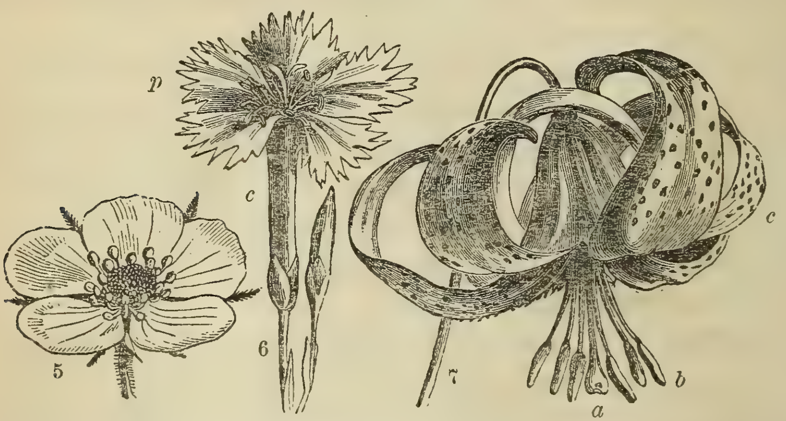
52. **Corolla** is a Latin word signifying a little crown, applied to the interior envelope of the flower. It consists of one or more circles of leaves, either distinct or united by their edges, usually of some other color than green, and of a more delicate texture than the calyx. Its leaves are called *petals.*

53. **Perianth** (περι, around, ἀνθος, flower) is a word in common use to designate the floral envelopes as a whole, without distinction of calyx and corolla. It is used in description, especially when these two envelopes are so similar as not to be readily distinguished, as in the Tulip, Lily, and the Endogens generally; also where only one envelope exists, as in Phytolacca, Elm, etc.

54. *The essential floral organs* stand within the circles of the perianth, and are so called because they are the immediate instruments in perfecting the seed, and thus accomplishing the final purposes of the flower. These organs are of two kinds, perfectly distinct in position and office—viz., the stamens and the pistils.

55. **The stamens** are those thread-like organs situated just within the perianth and around the pistils. Their number varies from one to a hundred or more; but the most common number is *five*. Collectively they are called the *andrœcium.*

56. **The pistils** (called also carpels) occupy the centre of the flower at the absolute terminus of the flowering axis. They are sometimes numerous, often apparently but one, always destined to bear the seed. Collectively they are called the *gynœcium.*



5, Flower of the Strawberry. 6, Flower of the Pink. 7, Flower of the Lily (Lilium superbum). The pupil will point out the parts.

57. **The torus** or receptacle is the axis of the flower, situated at the summit of the flower-stalk. It commonly appears a flattened or somewhat convex disk, whose centre corresponds to the apex of the axis. On this disk, as on a platform, stand the floral organs above described, in four concentric circles. The gynœ-

cium (pistils) occupies the centre; the andrœcium encircles it; the corolla is next without; and the calyx embraces the whole.

Review.—49. Agency of the Flower. 50. Members. What are the Floral envelopes? Which is the calyx? The corolla? 51. The calyx defined. The sepals. 52. The corolla defined. Petals. 53. What of the perianth? 54. The essential organs. 55. The stamens. Another name. 56. The pistils. Their collective name. 57. The torus. Order of the whole.

CHAPTER II.

PLAN OF THE FLOWER.

58. Such, in general, is the organization of the flower. It is simple enough in theory; and in most of the plants with which he meets, the student will easily recognize these several organs by name. But, in truth, flowers vary in form and fashion to a degree almost infinite. Each organ is subject to transformations, disguises, and even to entire extinction; so that the real nature of the flower may become an intricate and perplexing study.

59. But we shall soon see that in all these variations there is method. They are never capricious or accidental, however much they may appear so. *Unity in diversity* is characteristic of Nature in all her departments, and eminently so in the flowers; and the first step in the successful study of them is to discover that unity—that *simple idea* of the floral structure in which all its diversities harmonize. Before flowers were created, that idea or *type* was conceived; and to possess it ourselves is a near approach to communion with the Infinite Author of Nature.

60. **The typical flower,** one that exemplifies the full idea of the floral structure, consists of four different circles of organs, as before described, placed circle within circle on the torus, and all having a common centre. Such a flower must possess these five attributes—viz.: It must be

a, *Complete;* having the four kinds or sets of organs arranged in as many concentric circles. That it is *perfect*, having both kinds of the essential organs, is necessarily included under its completeness.

b, *Regular;* having the organs of the same name all similar and alike; that is, all the petals of one pattern, all the stamens alike in form, size, position, etc.

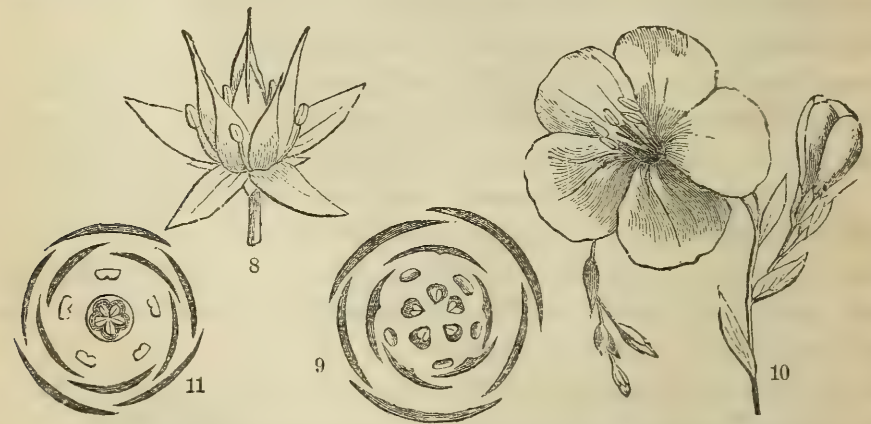
c, *Symmetrical;* having the same number of organs in each set or circle.

d, *Alternating* in respect to the position of the organs. This implies that the several organs of each set stand not opposite to, but alternating with the organs of the adjacent set;—the petals alternate with the sepals and stamens; the stamens alternate with the petals and pistils.

e, That the organs be *distinct*, all disconnected and free from each other.

61. This is the Type. But it is seldom fully realized in the flowers as they actually grow, although the tendency toward it is universal. Deviations occur in every imaginable mode and degree, causing that endless variety in the floral world which we never cease to admire. For example, in our pattern flowers (5, 6, 7,) the pistils seem too few in the Pink and Lily, and the stamens too many in all of them.

62. The flower of the Flax (10) combines very nearly all the conditions above specified. It is complete, regular, symmetrical. Its organs are alternate and all separate; and (disregarding the slight cohesion of the pistils at their base) this flower well realizes our type. Admitting two whorls of stamens instead of one, we have a good example of our type in Stone-crop (Sedum ternatum), a little fleshy herb of our woods. Its flowers are both 4-parted and 5-parted in the same plant. See also the 12-parted flowers of the common Houseleek.



8, Flower of Crassula lactea, regular, symmetrical, organs distinct. 9, Diagram showing its plan. 10, Flower of the Scarlet Flax. 11, Diagram of its plan.

63. The flowers of Crassula (8), an African genus sometimes cultivated, afford unexceptionable examples, the sepals, petals,

stamens, and pistils each being five in number, regularly alternating and perfectly separate.

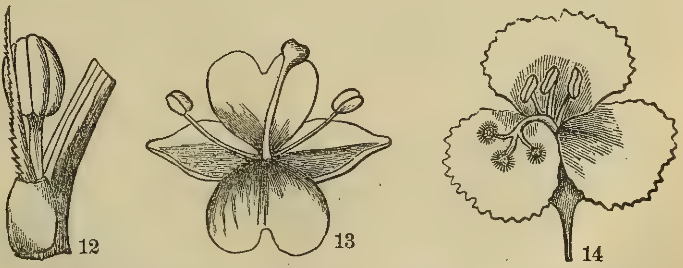
Review.—58. Whence the difficulties in the study of flowers? 59. A grand characteristic in Nature. First step in the study of the flowers. 60. Define the typical flower. Why is it complete? Why regular? Why symmetrical? How alternating? How distinct? 61. Is the type often realized? Whence the endless variety? *Faults* in Pink, Strawberry, Lily. 62. One fault of Flax—of Sedum. 63. One perfect example.

CHAPTER III.

STUDY OF ANOMALOUS FLOWERS.

64. **Now the true method of studying the flower** is by comparing it with this type. So shall we be able, and ever delighted, to learn the nature of each organ in all its disguises of form, and to discern the features of the general plan even under its widest deviations. The more important of them are included under the following heads, which will be considered in order: 1, Variations of the radical number of the flower; 2, Deficiencies; 3, Redundancies; 4, Union of parts; 5, Irregularities of development.

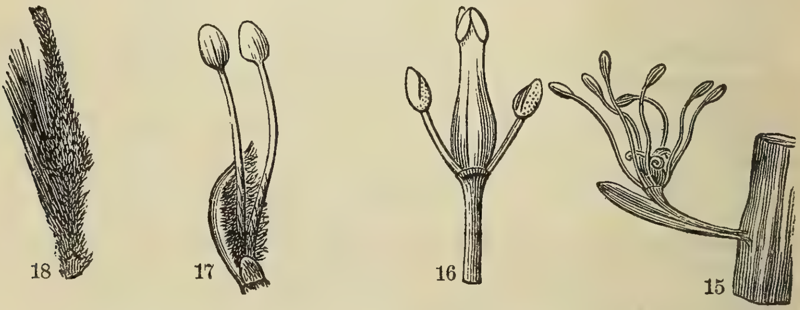
65. **The radical number** of the flower is that which enumerates the parts composing each whorl. Here nature seems most inclined to the number *five*, as in Crassula, Flax, Rose, and Strawberry. It varies, however, from one to twelve, and is expressed by word or sign as follows: di-merous, or 2-parted ($\overset{2}{\checkmark}$), tri-merous or 3-parted ($\overset{3}{\checkmark}$), penta-merous or 5-parted ($\overset{5}{\checkmark}$), etc. The flowers of Hippuris (12) are 1-parted, having but one stamen and one pistil. Those of Circæa (13) are 2-parted, having 2 sepals, 2 petals, 2 stamens, etc. Those of Xyris (14) are $\overset{3}{\checkmark}$, having all the parts in 3s. Xyris is one of the Endogens.



12, Flower of Hippuris, one-parted. 13, Flower of Circæa Lutetiana, $\overset{2}{\checkmark}$. 14, Flower of Xyris, $\overset{3}{\checkmark}$.

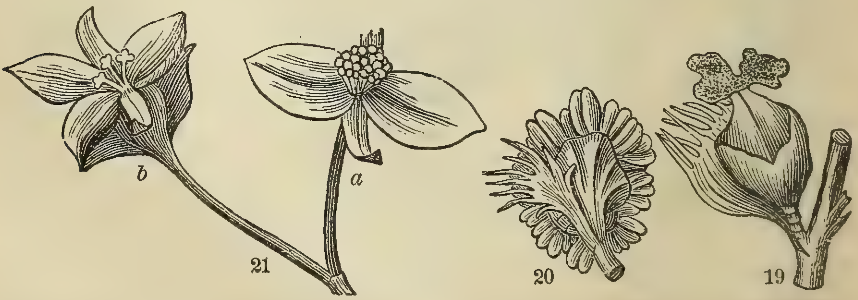
Trimerous flowers are characteristic of this great group of Plants, while pentamerous flowers commonly distinguish the Exogens.

66. **Deficiencies** often occur, rendering the flower *incomplete.* Such flowers lack some one or more entire sets of organs. When only one of the floral envelopes, the calyx, exists, the flower is said to be *apetalous* or monochlamydeous (χλαμὺς, a cloak), as in Elm, Phytolacca. These terms are also loosely applied to such plants as Rhubarb, Anemone, Liverwort, where the pieces of the perianth are all similar, although in two or three whorls. When the perianth is wholly wanting, the flower is said to be achlamydeous, or *naked*, as in Lizard-tail (15).



15, Flower of Saururus (Lizard-tail)—achlamydeous. 16, Flower of Fraxinus (Ash). 17, Flower of Salix (Willow), staminate—18, pistillate.

67. *Imperfect flowers* are also of frequent occurrence. They are deficient in respect to the essential organs. A *sterile* or staminate flower (denoted thus ♂) has stamens without pistils. A *fertile* or pistillate flower (♀) has pistils without stamens. Such flowers being counterparts of each other, and *both* necessary to the perfection of the seed, must exist either together upon the same plant or upon separate plants of the same species. In the former case the species is *monœcious* (☿), as in Oak; in



19, Pistillate flower of Balm-of-Gilead. 20, Staminate. 21, Begonia—*a*, staminate; *b*, pistillate.

the latter case *diœcious* (♂ ♀), as in Willow. The term *diclinous*, denoting either 8 or ♂ ♀ without distinction, is in common use.

68. *A neutral flower* is a perianth or calyx only, having neither stamens nor pistils. Such are the ray-flowers of many of the Compositæ, and of the cymes of Hydrangea, High-cranberry, etc., which in cultivation may all become neutral, as in the Snow-ball.

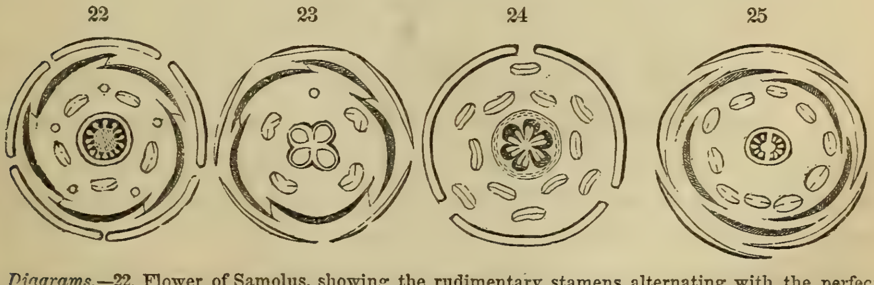
69. *Unsymmetrical flowers.* The term symmetry, as used in Botany, refers to number only. A flower becomes unsymmetrical by the partial development of any set or circle in respect to the number of its organs. The Mustard family, called the Crucifers, afford good examples.

70. The flowers of Mustard, Cress, etc., are understood to be 4-merous ($\sqrt[4]{}$). The sepals are four, petals four, but the stamens are six and the styles but two. The stamens are arranged in two circles, having two of those in the outer circle suppressed or reduced to mere glands. Two of the carpels are also suppressed (429). In the Mint family and the Figworts one or three of the stamens are generally abortive. Here, while the flowers are $\sqrt[5]{}$, the stamens are four in some species and only two in others. The missing stamens, however, often appear in the guise of slender processes—the rudiments of stamens—proving in an interesting manner the natural tendency to symmetry.

71. In the $\sqrt[4]{}$ flowers of Poppy, the sepals are but two; in $\sqrt[5]{}$ Spring-beauty they are but two; in both cases too few for symmetry. In Larkspur (26) the $\sqrt{}$ flowers have but four petals; and in Monk's-hood (29), also $\sqrt[5]{}'$, the petals are apparently but two, strangely deformed bodies. A careful inspection, however, generally reveals the other three, very minute, in their proper places, as displayed in the cut.

72. "*Organs opposite*" is a condition much less frequent than "organs alternate," but is highly interesting, as being sometimes characteristic of whole families. Thus in the Primrose, Thrift, and Buckthorn families, the stamens always stand opposite to the petals!

73. How happens this? Among the Primworts this question is solved in the flowers of Lysimachia and Samolus, where we



Diagrams.—22, Flower of Samolus, showing the rudimentary stamens alternating with the perfect. 23, Flower of a Labiate plant, showing the place of the deficient stamen. 24, Flower of Asarum—three sepals twelve stamens, etc. 25, Flower of Saxifrage—two pistils, ten stamens, etc.

find a circle of five teeth (abortive filaments) between the petals and stamens, alternating with both sets, thus restoring the lost symmetry. Hence we infer that in such cases generally a circle of alternating organs has been either partially or wholly suppressed. In the Buckthorn, however, a different explanation has been given.

74. **Redundancy.** *The multiplication of organs* is exceedingly common, and usually according to a definite plan. The increase takes place, as a rule, by circles, and consequently by *multiples.* That is, *e. g.*, the stamens of a $\sqrt[3]{\ }$ flower, if increased, will be so by 3s; of a $\sqrt[5]{\ }$ flower by 5s, etc.—sometimes to the extent of twenty such circles.

75. In the Crowfoot family the stamens are almost always multiplied. The carpels are also generally multiplied, yet often, on the contrary, diminished, as in the Pæony. In Rosaceæ, also, the stamens are generally multiplied, while the carpels exist in all conditions as to number. Thus in Strawberry they are multiplied, in the Apple they are regularly five, in Agrimony reduced to two, and in the Cherry to one. In Magnolia the $\sqrt[3]{\ }$ flowers have three sepals in one circle, six or nine petals in two or three circles, numerous stamens and carpels in many circles of each. In the $\sqrt[4]{\ }$ flowers or Blood-root there are two sepals, eight petals, twenty-four stamens, and two carpels.

76. *Chorisis.* In other cases the organs seem to be increased in number by clusters, rather than by circles, as when in the same circle several stamens stand in the place of one—*e. g.*, in Squirrel-corn, St. Johnswort, Linden. Such cases afford wide scope for conjecture. Perhaps each cluster originates by division, as the compound from the simple leaf; or as a tuft of axillary leaves; or thirdly, by a partial union of organs.

Review.—64. How to study flowers. Five general modes of deviation from the Type. 65. The radical number. How expressed. Give examples. 66. Incomplete flowers. Apetalous flowers. Naked flowers. Examples. 67. Imperfect flowers. The sterile. The fertile. Monœcious. Diœcious. Examples. 68. Neutral flowers. 69. Unsymmetrical flowers. 70. Case of the Mustard. Case of the Mint tribe. 71. Case of the Poppy. Larkspur. 72. Organs opposite. 73. How explained. 74. Law of the multiplication of organs. Illustrate this in Pinks, Lilies, Syringa, Magnolia.

CHAPTER IV.

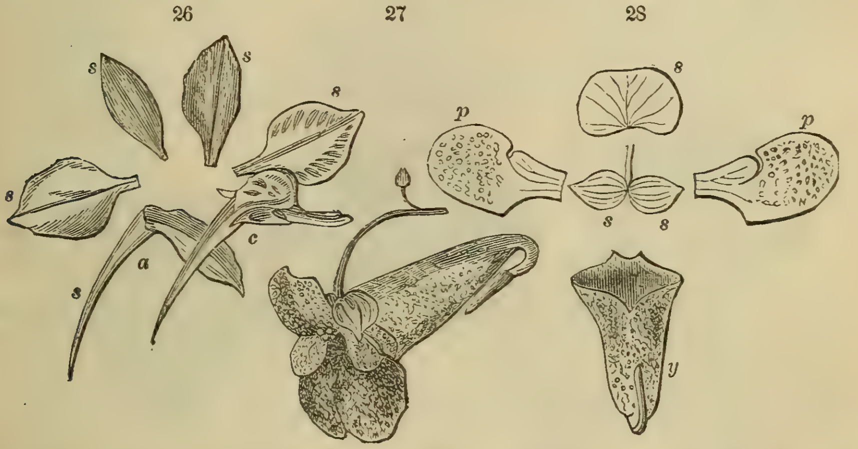
ANOMALOUS FLOWERS—CONTINUED.

77. *Appendicular organs* consist of spurs, scales, crown, glands, etc., and often afford excellent distinctive marks. The old term *nectary* was indiscriminately applied to all such organs, because some of them produced honey.

78. *Spurs* are singular processes of the flower, tubular and projecting from behind it. In Columbine each petal is thus

spurred;—in Violet, one petal only; in Larkspur, two petals and a sepal, the spur of the latter inclosing that of the former. The curved spur of the Jewel-weed belongs to a sepal (27, 28).

79. *Scales* are attached to the inner side of the corolla, usually upon the claw of the petals, as in Buttercups, or within the throat of the corolla tube, as in the Borrageworts. Similar appendages, when enlarged and conspicuous, constitute a *crown* in Catchfly, Corn-cockle, Narcissus. See also the *staminal crown* of the Silk-grass (Asclepias, fig. 532).



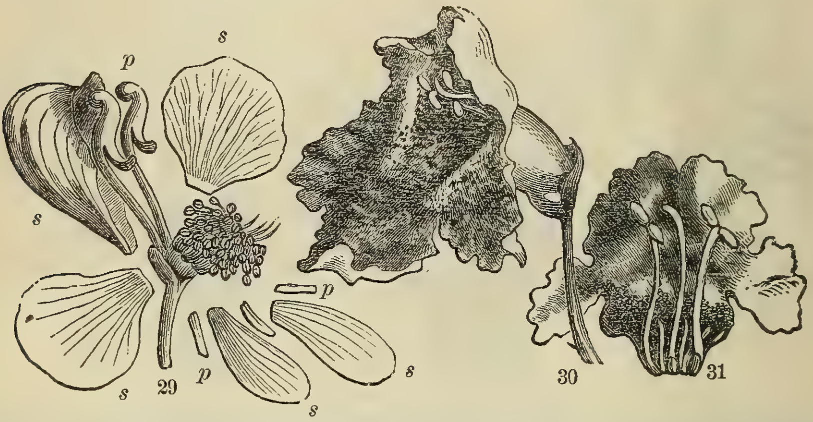
26, Flower of Delphinium Consolida (common Larkspur), displaying *s*, *s*, *s*, *s*, *s*, the five sepals—*a*, the upper one spurred; *c*, the corolla of four petals, here united into one and produced into a spur. 27, Flower of Impatiens fulva (Touch-me-not). 28, Displaying *s*, *s*, *s*, *y*, the four sepals, *y* being saccate and spurred; *p*, *p*, the two petals, both double, preserving the symmetry.

80. *Glandular bodies* are often found upon the receptacle in the places of missing stamens or carpels, or as abortive organs of some kind. Examples are seen in the Crucifers and Grape. In Grass-Parnassus they are stalked and resemble stamens.

81. **The union of organs** in some way occurs in almost every flower; and, more perhaps than any other cause, tends to disguise its plan and origin. The separate pieces which stood each as the representative of a leaf, now, by a gradual fusion, lose themselves in the common mass. Nevertheless, marks of this process are always discernible, either in parts yet remaining *free*, or in the *seams* where the edges were conjoined. The floral organs may unite by *cohesion* or *adhesion*.

82. *Cohesion*, when the parts of the same whorl are joined

together; as the sepals of the Pink, the petals of Morning-glory, the stamens of Mallows, the carpels of Poppy. *Adhesion*, when the parts of different whorls are conjoined; as the stamens with the corolla in Phlox, with the pistils in Milkweed, Lady's-slipper; or calyx with ovary, in Apple or Wintergreen (Gaultheria). The adjective *free* is used in a sense opposite to adhesion, implying that the organ is inserted on (or grows out of) the receptacle, and otherwise separated from any other kind of organ. The adjective *distinct* is opposed to cohesion, implying that like organs are separate from each other. More of this in another chapter.

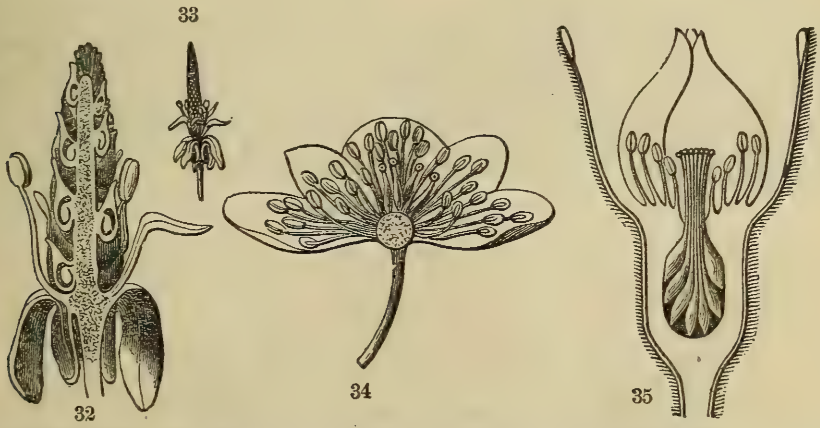


29, Flower of Aconitum Napellus displayed; *s*, *s*, *s*, *s*, *s*, the five sepals, the upper one hooded; *p*, *p*, *p*, the five petals, of which the two upper are nectaries covered by the hood, and the three lower very minute. 30, Flower of Catalpa, 2-lipped, 5-lobed. 31, Corolla laid open, showing the two perfect stamens and the three rudimentary.

83. **Irregular development.** Our typical flower, it will be remembered, is regular; and observation proves that all flowers are actually alike regular in the early bud. Those inequalities or "one-sided" forms, therefore, which characterize certain flowers, are occasioned by subsequent irregular growth from a regular type. The irregularity of flowers occurs in a thousand ways and modes;—in the unequal *size* of like organs; in their dissimilar *forms* and *positions;* in their unequal *cohesions*, and in their partial *suppressions*. So in the Violet (50), Monk's-hood (29), Catalpa (30), the Labiates (69), the Pea tribe (59), etc.

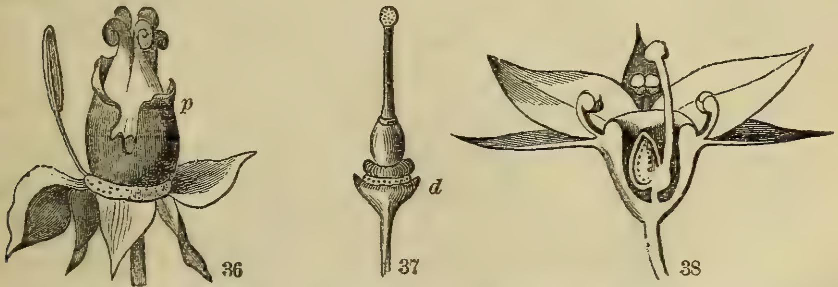
84. The torus, or receptacle, is sometimes strangely modified. In the little Myosurus (32), in some Buttercups, and in the

Tulip-tree we find a lengthened or *spindle-shaped torus*—lengthened according to the nature of a branch (§ 35), and all covered with the multiplied pistils. On the contrary, we have in the Rose (35) and Lady's-mantle (38), an excavated torus, within which the carpels are held, while the other organs are borne upon its elevated rim.



32, Flower (magnified) of Myosurus; a vertical section showing its elongated torus, etc. 33, The same, natural size. 34, Flower of Isopyrum biternatum; vertical section, showing the convex or globular torus, etc. 35, Flower of Rose, showing its excavated torus.

85. **The disk** is a portion of the receptacle raised into a rim somewhere in the midst of the whorls. It is found between the ovary and stamens in Pæony and Buckthorn. It bears the stamens in Maple and Mignonette, and crowns the ovary in the Umbelliferæ.



36, Pæonia Moutan, showing its very large disk (*d*) sheathing the ovaries (*p*). 37, Pistil of the Lemon, with its base surrounded by the disk, *d*. 38. Section of flower of Alchemilla, showing its single simple pistil, large disk, and excavated torus.

86. *Combined deviations* are quite frequent, and sometimes obscure the typical character of the flower to such a degree as to require close observation in tracing it out. The study of such cases is full of both amusement and improvement. For example, the 4 ✓

Poppy has suppression in the calyx, multiplication in the stamens and carpels, and in the latter cohesion also. The $\sqrt[5]{}$ Sage has cohesion and irregularity in the calyx, every kind of irregularity in the corolla, suppression and irregularity in the stamens, suppression and cohesion in the pistils. The $\sqrt[3]{}$ Cypripedium is perfectly symmetrical, yet has irregular cohesion in the calyx, great inequality in the petals, cohesion, adhesion, and metamorphosis in the stamens, and cohesion in the carpels.

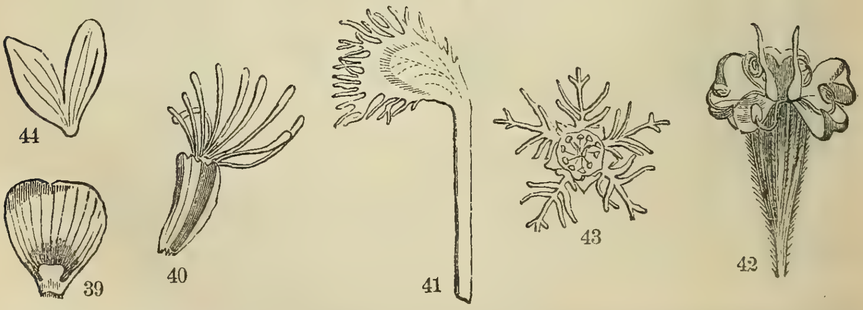
(In this way let the pupil analyze the deviations in the flower of Geranium, Hollyhock, Moth-mullein, Larkspur, Sweetbrier, Touch-me-not, Petunia, Snapdragon, Violet, Polygala, Squirrel-corn, Orchis, Henbit, Monk's-hood, Calceolaria, etc.)

Review.—77. Mention some appendicular organs. 78. What are spurs in Larkspur, etc.? 79. Scales in Buttercups, etc.? Explain the cuts 26–28.—The crown in Narcissus, etc.—In Aselepias. 80. Appendages in Grass-Parnassus. 81. Remarks on the union of organs. How detected? 82. Distinguish between cohesion and adhesion.—Between free and distinct. 83. What of flowers in the early bud? Whence irregularity? Certain modes of irregularity mentioned. Examples. 84. Two singular modifications of the torus. Explain cuts 32–35. 85. What is the disk?—figs. 36–38. 86. Trace the combined deviations in Poppy.—In Cypripedium.—In any flower at hand.

CHAPTER V.

THE FLORAL ENVELOPES, OR PERIANTH.

87. In our idea of the typical flower, the perianth consists of two whorls of expanded floral leaves encircling and protecting the more delicate essential organs in their midst. As a rule, the outer circle, calyx, is green and far less conspicuous than the inner circle of highly colored leaves—the corolla. But there are many exceptions to this rule. Strictly speaking, the calyx and corolla are in no way distinguishable except by *position*. The *outer* circle is the calyx, whatever be its form or color; and the *inner*, if there be more than one, is the corolla.



Forms of petals.—39, Buttercup, showing the scale at base. 40, Mignonette, fringed at top. 41, Silene stellata, fringed and unguiculate. 42, Flower of Osmorhiza longistylis, petals inflected. 43, Flower of Mitella diphylla, petals pectinate-pinnatifid. 44, Petal of Cerastium nutans. 2-cleft.

88. Both blade and petiole are distinguishable in the floral leaves, especially in the petals. The blade, or expanded part, is here called limb, or lamina; the petiolar part, when narrowed into a stalk, is called the claw. In form, or outline, there is a general resemblance between the limb and the leaf. It is ovate, oval, lanceolate, obcordate, orbicular, etc. In margin it is generally entire. (See § 308.)

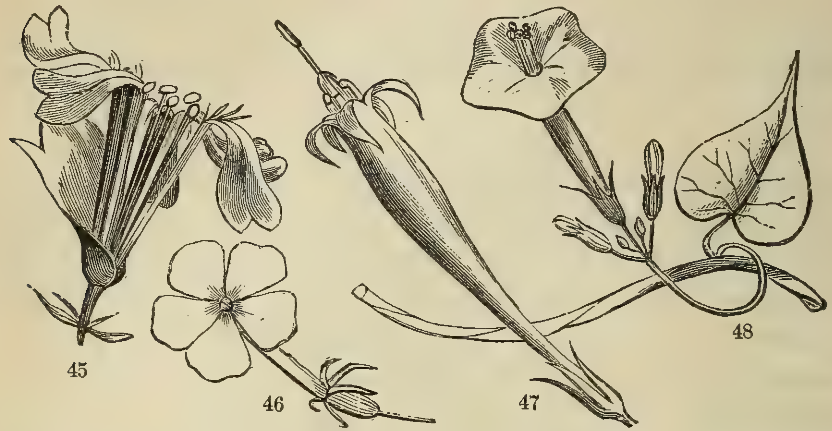
89. Some peculiar forms, however, should be noticed, as the bilobate petal of the Chickweed (44), the pinnatifid petal of Miterwort (43), the inflected petal of the Umbelliferæ (42), the fan-shaped petal of Pink, the fringed (fimbriate) petal of Campion (Silene stellata) (40), the hooded sepal of Napellus (29), the saccate petal of Calceolaria, Cypripedium (71). The limb is, moreover, often distorted into a true nectary, spurred, as already shown (§ 78), or otherwise deformed, as in Napellus, Coptis, etc.

90. We have seen that the floral organs are often in various ways united. Considering their crowded state in the flower, we rather wonder that they do not always coalesce in their growth. The calyx with united sepals was called by the early botanists *monosepalous;* the corolla with united petals was called *monopetalous* (μόνος, one—from the false idea that such an organ consisted of a single piece or leaf!) Opposed to these terms were *polypetalous* (πολύς, many), petals distinct; and *polysepalous,* sepals distinct.

91. The monosepalous calyx, or monopetalous corolla, although thus compounded of several pieces, is usually described as a simple organ, wheel-shaped, cup-shaped, tubular, according to the degree of cohesion. The lower part of it, formed by the united claws, whether long or short, is the *tube;* the upper part, composed of the confluent laminæ, is the *border,* or *limb;* the opening of the tube above is the *throat.*

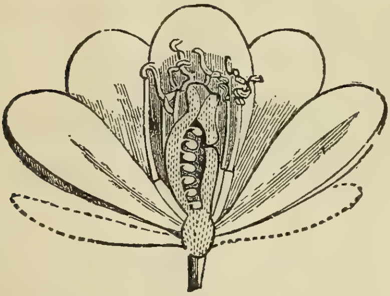
92. The border is either lobed, toothed, crenate, etc., by the distinct ends of the pieces composing it, as in the calyx of Pink, the calyx and corolla of Primula, Phlox, and Bellwort, or it may become, by a complete lateral cohesion, entire, as in the Morning-glory. Here the compound nature of the organ is shown by the seams alone.

93. A terminal cohesion, where summit as well as sides are joined, forming a *cap* rather than cup, rarely occurs, as in the calyx of the garden Escholtzia and the corolla of the Grape.



45, Flower of Saponaria (Bouncing Bet); petals and claws quite distinct. 46, Phlox; claws united, with lamina distinct. 47, Spigelia (Pink-root), petals still further united. 48, Quamoclit coccinea; petals united throughout.

94. The modes of adhesion are various and important, furnishing some of the most valuable distinctive characters. An organ is said to be *adherent* when it is conjoined with some dissimilar organ, as stamen with pistil. All the organs of our typical flower are described as *free.*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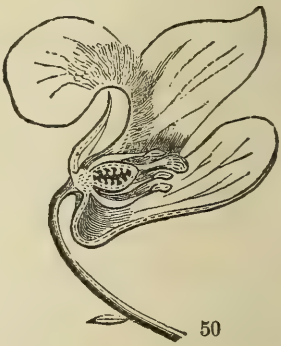
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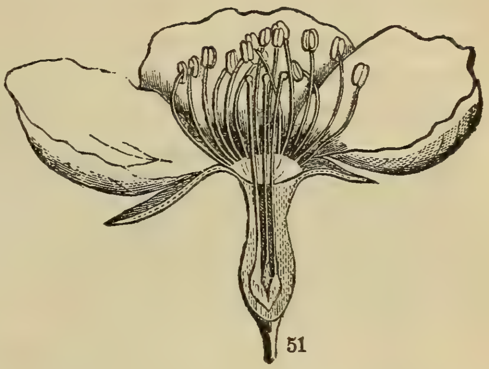
95. The term *hypogynous* (υπώ, under, γυνή, the pistil) is an adjective in frequent use, denoting that the organs are inserted into the torus *under*, or at the base of the ovary or pistil. Organs so situated are, of course, in the normal condition and *free*, there being no adhesions. Observe and explain the sections of Jeffersonia and Violet (49, 50).

96. *Perigynous* (*πεϱί*, around) is a term applicable to the stamens and petals only, and implies that they are (apparently) inserted on the calyx or corolla *around* the free ovary. In Phlox, the stamens are perigynous on the corolla-tube. In Cherry and Plum, the petals and stamens are perigynous on the calyx-tube. (See 51.)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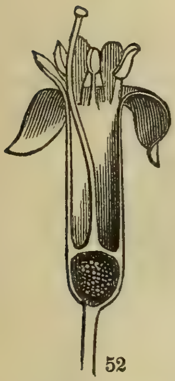
97. *Epigynous* (*επὶ*, upon) denotes that the organs are inserted (apparently) *upon* the ovary, as appears in Apple, Pear, Caraway, Sunflower. (See cuts 42, 51.) The common phrases "calyx superior," "ovary inferior," have the same signification as "calyx epigynous," all implying the apparent insertion of the organs upon or above the ovary. In this condition all the organs, or at least the calyx, are blended with the ovary to its top. Hence the phrases "ovary adherent," or "calyx adherent," have also the same meaning, and are preferable, because in accordance with the fact. (Explain the sections of Golden Currant and Ear-drop—52, 54.)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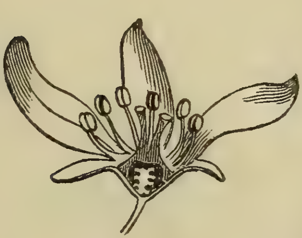
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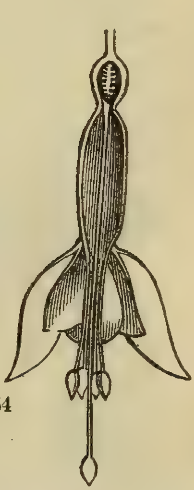
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52, Ribes aureum and (54) Fuchsia gracialis; ovary inferior or adherent, stamens and petals epigynous (*above* the *adherent* ovary). 53, Saxifraga Virginiensis; ovary half-superior.

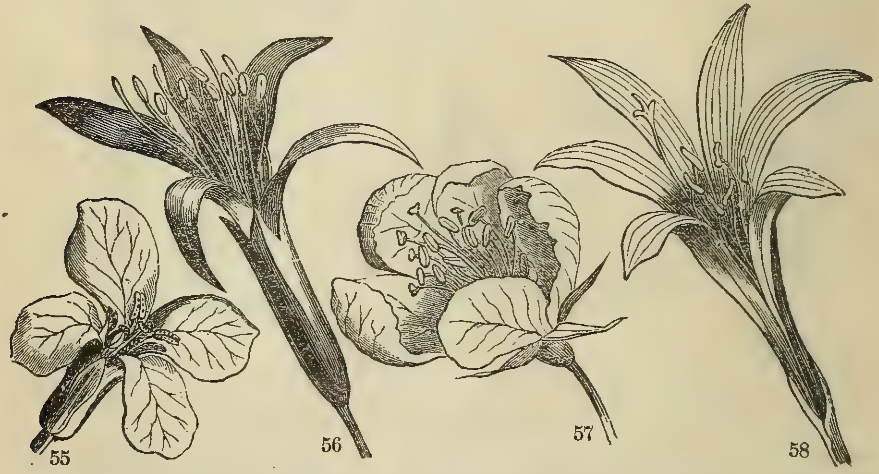
98. Calyx inferior or free, ovary superior or free, are all phrases of the same import as calyx hypogynous. Between the two conditions, calyx superior and calyx inferior, there are numerous gradations, of which one only is defined, to wit, calyx half-superior, as exemplified in the Mock-orange and Saxifrage (53).

Review.—87. The type once more. State the only true distinction between calyx and corolla. 88. What part in the floral leaves corresponds to blade? What part to petiole? General forms. 89. Several peculiar forms mentioned. 90. Why should the floral organs be united? What absurdity in the word *monosepalous*, etc.? The opposite terms. 91. What the tube?—the limb? 92. Varieties in the degree of cohesion (figs. 45–48). 93. How in Grape, etc.? 94. Define *adherent*. 95. Use of the word *hypogynous?* 96. *Perigynous?* 97. *Epigynous?* Two equivalent phrases. 98. Calyx half-superior. Explain figs. 49–54.

CHAPTER VI.

FORMS OF THE PERIANTH.

99. The innumerable forms of the perianth, whether calyx or corolla, or both, are first to be distinguished as POLYPETALOUS or GAMOPETALOUS, and secondly, as *regular* or *irregular*. The POLYPETALOUS-*regular* forms may be referred to the four types represented in the drawings below, and described as follows.

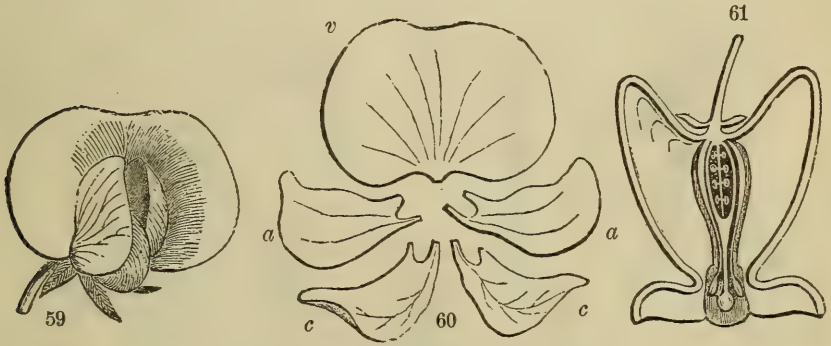


Forms of corollas.—55, Cheiranthus (Stock). 56, Silene regia (Scarlet Catchfly). 57, Pyrus coronaria. 58, Amaryllis (Atamasco Lily).

100. First, *Cruciform* (*crucis*, of a cross) or cross-shaped corollas consist of four long-clawed petals, placed at right angles to each other, as in Mustard, Wall-flower (55). 2d, *Caryophyl-*

laceous or pink-like corollas consist of five petals with long, erect claws, and spreading laminæ; as in the Pink (56). 3d, *Rosaceous* or rose-like corollas are composed of five short-clawed open petals; as in the Rose (fig. 57). 4th, *Liliaceous* flowers, like the Lilies, consist of a six-leaved perianth; each leaf gradually spreading so as to resemble, as a whole, the funnel-form (58).

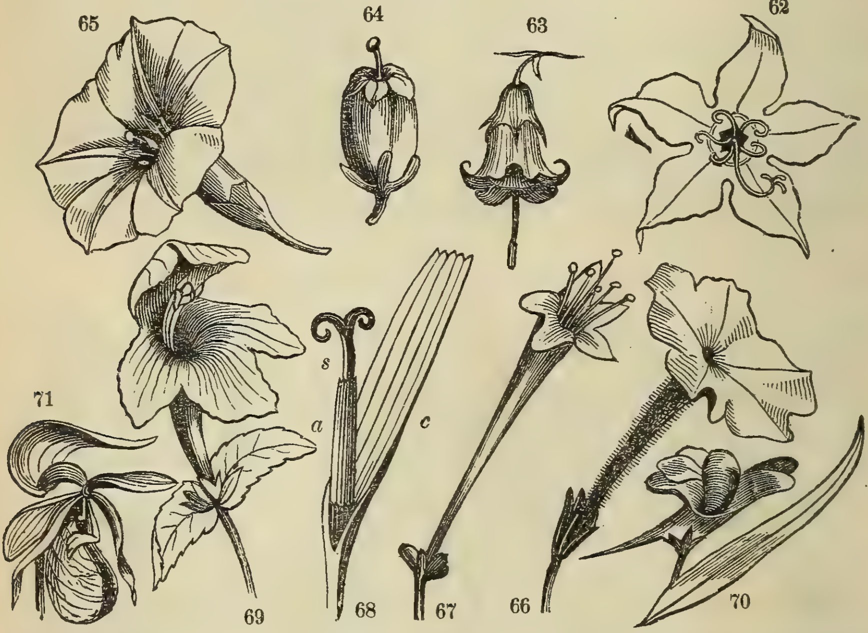
101. **Polypetalous-irregular** forms (59, 71) may generally be referred to these two types—the papilionaceous and the orchidaceous. The *Papilionaceous* (*papilio*, butterfly) corolla or flower may consist of five dissimilar petals, designated thus: the upper, largest, and exterior petal is the banner (*vexillum*); the two lateral, half-exterior, are the wings (*alæ*); the two lower, interior petals, often united at their lower margin, are the keel (*carina*). The flowers of the Pea, Locust, Clover, and of the great family of the Leguminosæ in general are examples. The *Orchidaceous* is a form of the perianth peculiar to the Orchis, and to that large and singular tribe in general. It is a 6-parted double perianth, very irregular, characterized chiefly by its *lip*, which is the upper petal (lower by the twisting of the ovary) enlarged and variously deformed.



59, Papilionaceous flower of the Pea. 60, Displayed; *v*, the vexillum; *a*, *a*, the alæ; *c*, *c*, the carina. 61, Section of flower of Dicentra Cucullaria.

102. **Gamopetalous-regular** perianths (62–67) may include mainly the following forms, although some of them may become irregular. First, *Rotate*, wheel-shaped, or star-shaped, is a form with tube very short, if any, and a flat, spreading border; as the calyx of Chickweed, corolla of Trientalis, Elder. It is sometimes a little irregular, as in Mullein. 2d, *Cup-shaped*, with pieces cohering into a concave border, as in the calyx of

Mallows, corolla of Kalmia, etc. 3d, *Campanulate*, or bell-shaped; when the tube widens abruptly at base and gradually in the border, as in the Harebell, Canterbury-bell. 4th, *Urceolate*, urn-shaped; an oblong or globular corolla with a narrow opening, as the Whortleberry, Heath. 5th, *Funnel-form* (infundibuliform), narrow-tubular below, gradually enlarging to the border, as Morning-glory. 6th, *Salver-form* (hypocrateriform), the tube ending abruptly in a horizontal border, as in Phlox, Petunia, both of which are slightly irregular. 7th, *Tubular*, a cylindraceous form spreading little or none at the border; as the calyx of the Pink, corolla of the Honeysuckle. It is often a little curved. Tubular flowers are common in the Compositæ, as the Thistle, Sunflower, when they are often associated with the next form, the *ligulate*.

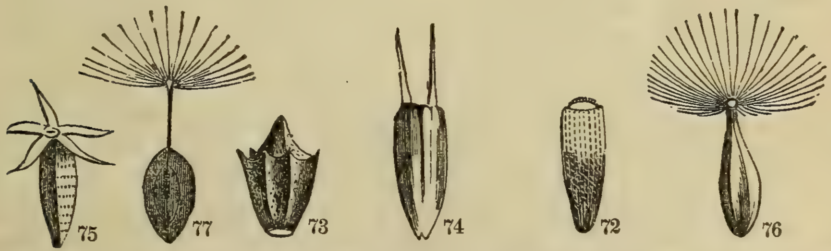


Forms of corollas.—62, Campanula Americana; rotate. 63, Campanula divaricata. 64, Andromeda; urceolate. 65, Convolvulus (Morning-glory). 66, Petunia. 67, Lonicera sempervirens (Honeysuckle). 68, Dandelion: ligulate corolla (*c*), 5-toothed; *a*, five anthers united into a tube around *s*, the style. 69, Synandra grandiflora, ringent, upper lip 2-lobed, lower 3-lobed. 70, Linaria (yellow Snapdragon), personate. 71, Cypripedium acaule, orchidaceous.

103. **Gamopetalous-irregular** perianths may be either ligulate or labiate. The *Ligulate* corolla (*ligula*, tongue) is formed as if by splitting a tubular corolla on one side. The notches at the end plainly indicate the number of united petals composing

it, as also do the parallel longitudinal seams. (See figs. 68, 69.) The *labiate*, bilabiate or lip-shaped, resembling the mouth of some animal, is a very common form, resulting from the unequal union of the parts, accompanied with other irregularities. In the labiate corolla three petals unite more or less to form the lower lip, and two to form the upper. In the calyx, when bilabiate, this rule is reversed, according to the law of alternation of organs; two sepals are united in the lower lip and three in the upper, as seen in the Sage and the Labiate Order generally. Labiate flowers are said to be *galeate* or helmeted when the upper lip is concave, as in Catmint; *ringent* or gaping when the throat or mouth is wide open (69); *personate* or masked when the throat is closed as with a *palate*, like the Snapdragon (70).

104. Certain *reduced forms* of the perianth should be noticed in this place. The *Pappus* (πάππος, grandfather, alluding to his gray hairs) is the hair-like calyx of the florets of the Compositæ, and other kindred Orders. The florets of this Order are collected into heads so compactly that the calyxes have not room for expansion in the ordinary way. The pappus is commonly persistent, and often increases as the fruit matures, forming a feathery sail to waft away the seed through the air, as in the Dandelion and Thistle. It varies greatly in form and size, as seen in the cuts; sometimes consisting of scales, sometimes of hairs, again of feathers or bristles. Sometimes it is mounted on a stipe, which is the beak of the fruit.



Cypsela (incorrectly called achenium) of the Compositæ, with various forms of pappus. 72, Eclipta procumbens, no pappus. 73, Ambrosia trifida. 74, Helianthus grosse-serratus, pappus 2-awned. 75, Ageratum conizoides, pappus of five scales. 76, Mulgedium, capillary pappus—cypsela slightly rostrate. 77, Lactuca elongata, rostrate cypsela.

105. Again: the calyx, or the limb of the calyx, is reduced to a mere *rim*, as seen in the Umbelliferæ. In the Amentaceous Orders, the whole perianth diminishes to a shallow cup, as in

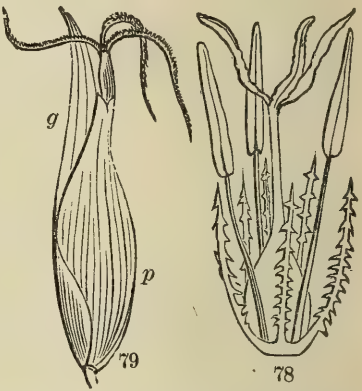
the Poplar and Willow, or altogether disappears, as in the Birch, Ash, and Lizard-tail (15, 16).

106. **Setæ**, meaning bristles in general, is a term specifically used to denote the reduced perianth of the sedges. In the Bog-rush (Scirpus) there is, outside the stamens, a circle of six setæ, representing a 6-leaved perianth (78). In the Cotton-grass (Eriphorum) the setæ are multiplied and persistent on the fruit, becoming long and cotton-like.

107. **Perigynium** is the name given to the urceolate perianth of Carex, investing the ovary but allowing the style to issue at its summit. It is composed of two united sepals, as indicated by the two teeth at the top (79).

108. **Glumes and pales** represent the floral envelopes, or rather the involucre of the Grasses (436). Their alternating arrangement clearly distinguishes them from a perianth.

109. **The duration** of the calyx and corolla varies widely, and is marked by certain general terms. It is *caducous* when it falls off immediately, as the calyx of Poppy, corolla of Grape; *deciduous* when it falls with the stamens, as in most plants; and *persistent*, if it remain until the fruit ripens, as the calyx of Apple. If it continue to grow after flowering, it is *accrescent;* and if it wither without falling off, it is *marescent.*



78, Flower of Scirpus lacustris, magnified; consisting of six setæ, three stamens, three pistils united, except the stigmas. 79, Flower of Carex rivularis ♀, with *g*, its glume, *p*, its bottle-shaped perigynium, 2-toothed at top, enveloping the triple ovary; stigmas, three.

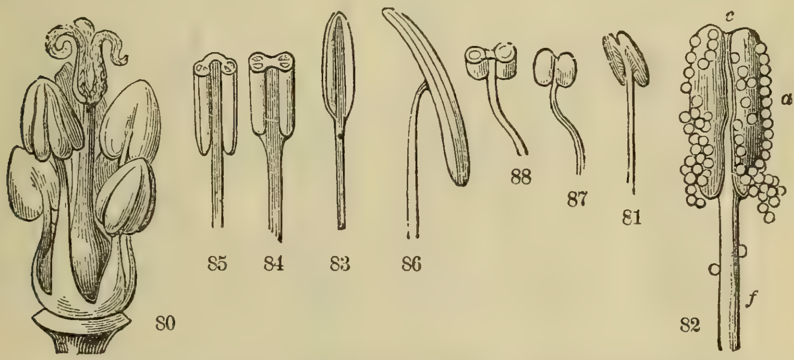
Review.—99. Primary distinctions in the forms of the perianth. 100. Four forms of polypetalous-regular perianths. To which belongs Stock? Pink? Apple? Lily? 101. Two forms of polypetalous-irregular—describe. Explain figs. 59–61. 102. Name the seven forms of gamopetalous-regular. To which belongs fig. 62? 63? 64? 65? etc. The flowers of Elder? Kalmia? Harebell? 103. Describe the gamopetalous-irregular forms, etc. 104. What is pappus? Describe the figures 72–77. 106. Perianth of Bog-rush—107. Of Carex—108. Of Grasses. Point out the glumes—The pales. 109. Define caducous—Deciduous—Accrescent—Marescent.

CHAPTER VII.

OF THE ESSENTIAL ORGANS.—THE STAMENS.

110. Within the safe inclosure of the floral envelopes stand the essential organs—the stamens and pistils—clearly distinguishable from the perianth by their more slight and delicate forms, and from each other by various marks. In the complete flower the ANDRŒCIUM next succeeds the corolla in the order of position, being the third set, counting from the calyx.

111. A perfect stamen consists of two parts—the *filament*, corresponding with the petiole of the typical leaf; and the *anther*, answering to the blade. Within the cells of the anther the *pollen* is produced, a substance essential to the fertility of the flower. Hence the anther alone is the essential part of the stamen.



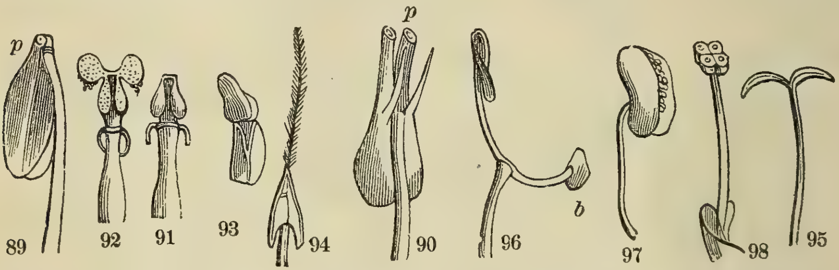
80, Andrœcium and gynœcium of Frankenia (after Peyer). 81, Stamen (adnate) of Morning-glory. 82, Same enlarged, with pollen grains discharged; *f*, filament; *a*, *a*, anther, 2-lobed; *c*, top of the connectile. 83, Ranunculus. 84, Same, cut transversely. 85, Iris, cut transversely (extrorse). 86, Amaryllis, versatile. 87, Larkspur, innate. 88, Same, cut.

112. **The filament** (*filum*, a thread) is the stalk supporting the anther at or near its top. It is ordinarily slender, yet sustaining itself with the anther in position. Sometimes it is *capillary*, and pendulous with its weight, as in the Grasses.

113. **The anther** is regularly an oblong body at the summit of the filament, composed of two hollow parallel lobes joined to each other and to the filament by the *connectile.* In front of the connectile, looking toward the pistil, there is usually a fur-

row; on its back a ridge, and on the face of each lobe a seam, the usual place of *dehiscence* or opening, all running parallel with the filament and connectile.

114. The stamen, as thus described, may be considered regular or typical in form, and is well exemplified in that of the Buttercup (fig. 83). But the variations of structure are as remarkable here as in other organs, depending on such circumstances as, 1st, the attachment of filament to anther. This may occur in three ways. The anther is said to be *innate* when it stands centrally erect on the top of the filament; *adnate* when it seems attached to one side of the filament; *versatile* when connected to the top of the filament by a single point in the back. 2d, The modes of *Dehiscence* or opening, are also three—viz., *valvular*, where the seam opens vertically its whole length, which is the usual way; *porous*, where the cells open by a chink or pore, usually at the top, as in Rhododendron and Potato; *opercular*, when by a lid opening upward, as in Sassafras, Berberis (92). 3d, The facing of the anther is also an important character. It is *introrse* when the lines of dehiscence look toward the pistil, as in Violet; *extrorse* when they look outward toward the corolla, as in Iris. 4th, The *connectile* is usually a mere prolongation of the filament, terminating, not at the base, but at the top of the anther. If it fall short, the anther will be *emarginate*. Sometimes it outruns the anther, and tips it with a terminal appendage of some sort, as in Violet, Oleander, and Paris. Again, its base may be dilated into spurs, as in two of the stamens of Violet. 5th, If the connectile be laterally dilated, as we see gradually done in the various species of the Labiate Order, the lobes of the anther will be separated, forming two *dimidiate* (halved) anthers on one filament, as in Sage and Brunella. Such are, of course, 1-celled (96).



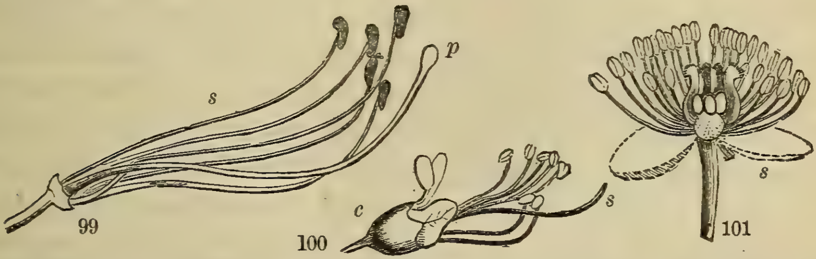
Peculiar forms of stamens.—89, Pyrola rotundifolia; *p*, dehiscence by pores at top. 90, Vaccinium uliginosum; *p*, dehiscence. 91, Berberis aquifolium, anthers opening (92) by valves upward. 93, Anther of Violet, introrse, with an appendage at top. 94, Oleander, sagittate, appendaged. 95, Catalpa, lobes of anther separated. 96, Sage, lobes of anther widely separated, on stipes; *b*, barren lobe without pollen. 97, Malva, anther 1-celled. 98, Ephedra (after Peyer), anther 4-celled.

115. The cells of the anthers are at first commonly four, all parallel, becoming two only at maturity. In some plants the four are retained, as in the anthers of Ephedra (98). In others, as Mallows, all the cells coalesce into one (97).

116. *Appendages* of many kinds distinguish the stamens of different species. In the Ericaceæ there are horns, spurs, tails, queues, etc. In Onions and Garlic, the filament is 2 or 3 forked, bearing the anther on one of the tips. Sometimes a pair of appendages appear at base, as if stipulate. It is often conspicuously clothed with hairs, as in Tradescantia. (See 89–94, .)

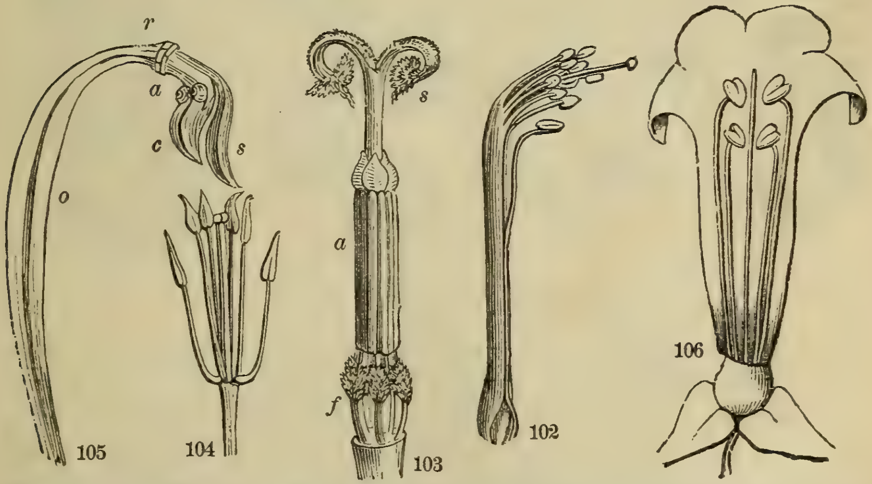
117. *Staminodia*, or sterile filaments with abortive anthers or none, occur singly in many of the Figworts and Labiates, or in entire whorls next within the petals, alternating with them, as in Loose-strife. The curious fringes of the Passion-flower are regarded as composed of staminodia (112).

118. **The number** of the stamens is said to be *definite* when not exceeding twenty, as is sometimes definitely expressed by such terms as follow, compounded of the Greek numerals—viz., *monandrous*, having one stamen to each flower; *diandrous*, with two stamens; *pentandrous*, with five stamens. If the number exceeds twenty, it is said to be *indefinite* (denoted thus, ∞) or *polyandrous.*



Essential organs.—99, Rhododendron, five stamens (*s*), one pistil (*p*), oblique or slightly irregular. 100, Flower of Æsculus (Buckeye), regular, 5-toothed calyx (*c*), very irregular 4-petalled corolla, seven stamens unequal, one style (*s*). 101, Flower of Hydrastis; *s*, sepals deciduous.

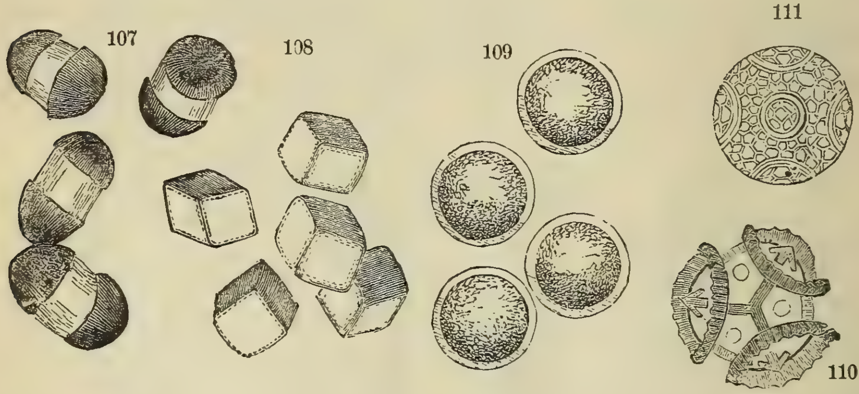
119. **The position** or insertion of the stamens (§ 55) may be more definitely stated here as *hypogynous*, on the receptacle below the ovaries; *perigynous*, on the calyx around the ovary; *epipetalous*, on the corolla, as in Phlox; *epigynous*, on the ovary at its summit, and *gynandrous* (γυνή, pistil, ἀνδρες, stamens) on the pistil, that is, when the stamens are adherent to the style, as



102, Stamens (diadelphous) of a Leguminous plant. 103, Stamens (syngenesious) of a Composite; *f*, filaments distinct; *a*, anthers united; *s*, stigmas revolute, etc. 104, Tetradynamous stamens of a Crucifer. 105, Gynandrous column of Cypripedium; *o*, ovary; *r*, torus; *s*, sterile stamen; *a*, two pollinia; *c*, stigma. 106, Didynamous stamens of Lophospermum.

in Orchis. Inequality in length is definitely marked in two cases, as *tetradynamous* (τετρὰς, four, δὺναμις, power) when the stamens are six, whereof four are longer than the other two, as in all the Crucifers; *didynamous*, where the stamens are four, two of them longer than the other two, as in all the Labiates (104, 106).

120. **Cohesion** is as frequent with stamens as with petals. They are *monadelphous* (ἀδελφός, a brother) when they are all united, as in Mallow, into one set or brotherhood by the filaments; *diadelphous* in two sets, whether equal or unequal, as in Pea, Squirrel-corn; *polyadelphous*, many sets, as in St. Johnswort; and *syngenesious*, when they are united by their anthers, as in the Compositæ. Finally, the absence of the stamens altogether, whether by abortion, as in the ♀ flowers of Veratrum, or by suppression, as in Oak, occurs in various modes, rendering the plant monœcious (⚥), diœcious (♂ ♀), or polygamous (♂ ☿ ♀), as already explained (§ 67).

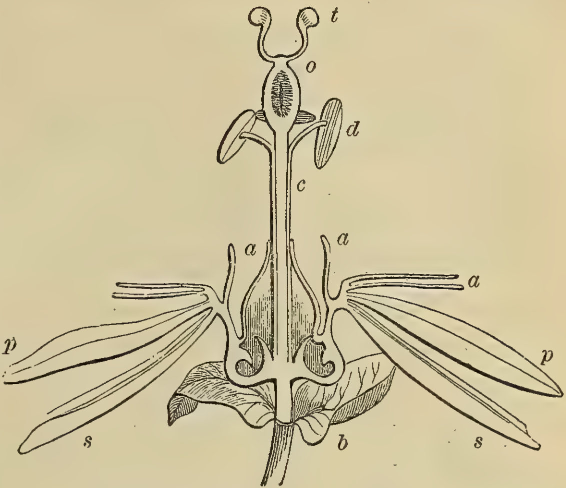


Pollen grains.—107, Pinus larico. 108, Basella rubra. 109, Ranunculus repens. 110, Scolymus grandiflorus. 111, Passiflora incarnata.

121. **The pollen** is in appearance a small, yellow dust, contained in the cells of the anther. When viewed with the microscope it appears as grains of various forms, usually spheroidal or oval, sometimes triangular or polyhedral, but always of the same form and appearance in the same species. Externally they are curiously, and often elegantly figured with stripes, bands, dots, checks, etc. Each grain of pollen is a membranous cell or sack containing a fluid. Its coat is double—the outer is more thick and firm, exhibiting one or more breaks where the inner

coat, which is very thin and expansible, is uncovered. In the fluid are suspended molecules of inconceivable minuteness, said to possess a tremulous motion. When the membrane is exposed to moisture, it swells and bursts, discharging its contents.

122. In the Orchids and Silkweed tribe, the pollen grains do not separate as into a dust or powder, but all cohere into masses called POLLINIA, accompanied by a viscid fluid.



112, Section of the Passion-flower (Passiflora cœrulea); *b*, bracts of the involucre; *s*, sepals; *p*, petals; *a*, *a*, staminodia or sterile filaments; *c*, stipe; *o*, ovary; *d*, stamens; *t*, stigmas.

Review.—110. Position of the stamens. 111. Members, compared with a leaf. Pollen. The filament. 113. The anther. Connectile. Dehiscence. In 82, point out these parts. 114. How the anther is attached to the filament—3 modes. Of dehiscence—3 modes. Define "anther introrse"—"Anther extrorse." What figures illustrate? What are dimidiate anthers? 115. The cells in regard to number. Mention some appendages. What are staminodia? 118. Define the terms definite and indefinite, as applied to the stamens. Define the terms relating to position—To inequality in length. 120. Four terms relating to cohesion. Three terms expressing absence. The pollen as seen under the microscope. Structure. Pollinia.

CHAPTER VIII.

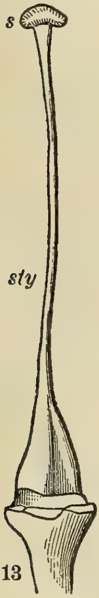
OF THE ESSENTIAL ORGANS.—THE PISTILS.

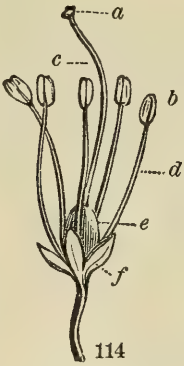
123. **The Gynœcium** occupies the centre of the flower, at the termination of the axis. It consists regularly of a circle of distinct pistils (§ 60), symmetrical in number with the other circles. It is subject to great variation. The pistil may be distinct and *simple*, as in Columbine, or coherent in various degrees into a *compound* body, as in St. Johnswort. Also instead of being free and superior, as it regularly should be, it may adhere to the other circles, as already explained (§ 97), and become

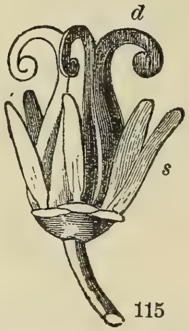
inferior; that is, apparently placed below the flower, as in the Currant (52).

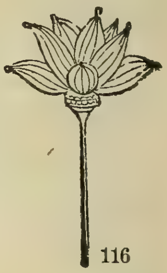
124. The number of the pistils is by no means confined to the radical of the flower. They may be increased by multiples, becoming a *spiral* on a lengthened receptacle, as in Tulip-tree, or still remaining a circle, as in Poppy. On the other hand, they may be reduced in number often to one, as in Cherry and Pea. Certain terms are employed to denote the number of pistils in the flower, such as *monogynous*, with one pistil; *trigynous*, with three; *polygynous*, with many, etc.

125. **The simple pistil** may usually be known from the compound, by its one-sided forms—having two sides similar and two dissimilar. If the pistils appear distinct, they are all simple, never being united into more than one set, as the stamens often are. The parts of a simple pistil are three—the *ovary* (*o*, 113) at base, the *stigma* (*s*) at the summit, and the *style* (*sty*) intervening. Like the filament, the style is not essential; and when it is wanting, the stigma is *sessile* upon the ovary, as in Anemone (116). In order to understand the relation of these parts, we must needs first study—





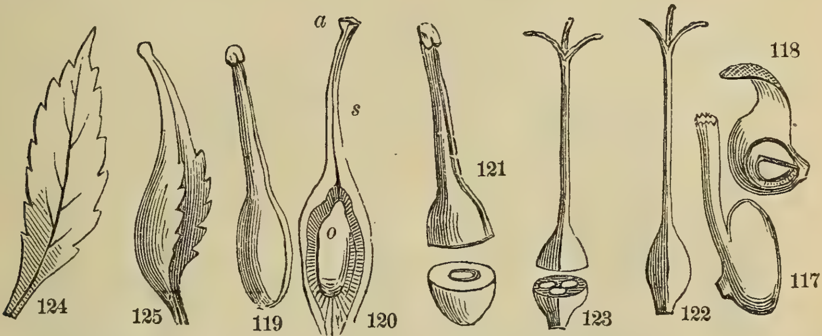




113, Pistil of Tobacco. 114, Pistil, stamens, and calyx of Azalea. 115. Trillium—stigmas (*d*) and anthers (*s*) nearly sessile. 116, Pistils of Rue Anemone (*A. thalictroides*)—stigmas sessile.

126. **The morphology of the pistil.** As before stated, the pistil consists of a modified leaf called a carpel (καρπὸς, fruit), or carpellary leaf. This leaf is folded together toward the axis, so that the upper surface becomes the inner, while the

lower becomes the outer surface of the ovary. By this arrangement two sutures or seams will be formed—the dorsal, at the back, by the midvein; the ventral, in front, by the joined margins of the leaf. This view of the pistil is remarkably confirmed and illustrated by the flowers of the Double Cherry (124, 125), where the pistil may be seen in every degree of transition, reverting toward the form of a leaf. This carpellary leaf stands in the place of the pistil, having the edges infolded toward each other, the midvein prolonged and dilated at the apex, as shown in 125.



117, Simple pistil of Strawberry, the style lateral. 118, Simple pistil of Crowfoot, cut to show the ovule. 119, Simple pistil of the Cherry. 120, Vertical section showing the ovule (*o*), style (*s*), stigma (*a*). 121, Cross-section of the same. 122, Compound pistil of Spring-beauty. 123, Cross-section of the same, showing the 3 cells of the ovary. 124, Expanded carpellary leaf of the Double Cherry. 125, The same partly folded, as if to form a pistil.

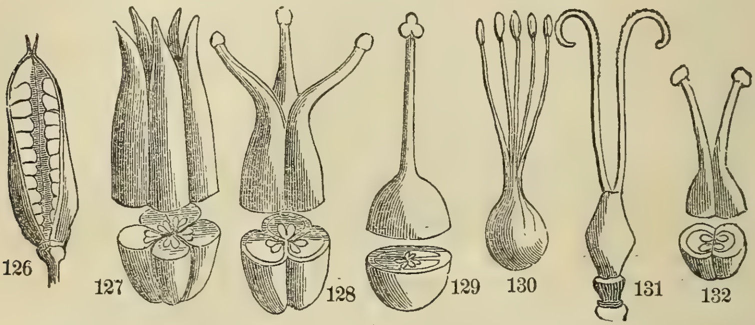
127. **The placentæ** are usually prominent lines or ridges extending along the ventral suture within the cell of the ovary, and bearing the ovules. They are developed at each of the two edges of the carpellary leaf, and are consequently closely parallel when those edges are united, forming one double placenta in the cell of each ovary.

128. The *simple carpel*, with all its parts, is completely exemplified in the Pea-pod. When this is laid open at the ventral suture, the leaf form becomes manifest, with the peas (ovules) arranged in an alternate order along each margin, so as to form but one row when the pod is closed. In the pod of Columbine (127), the ovules form two distinct rows; in the simple Plum carpel, each margin bears a single ovule; and in the one-ovuled Cherry, only one of the margins is fruitful.

129. The *stigma* is the glandular orifice of the ovary, communicating with it either directly or through the tubiform style. It is usually globular and terminal, often linear and lateral, but subject to great variations in form. It is sometimes double or halved, or 2-lobed, even when belonging to a single carpel or to

a simple style, as in Linden, where these carpels are surmounted by three pairs of stigmas.

130. The *compound pistil* consists of the united circle of pistils, just as the monopetalous corolla consists of the united circle of petals. The union occurs in every degree, always commencing at the base of the ovary and proceeding upward. Thus in Columbine, we see the carpels (pistils) quite distinct; in early Saxifrage, cohering just at base; in Pink, as far as the top of the ovaries, with styles distinct; in Spring-beauty, to the top of the styles, with stigmas distinct; and in Rhododendron, the union is complete throughout.



126, Ovary (follicle) of Larkspur, composed of a single carpellary leaf. 127, Ovaries of the Columbine, five, contiguous but distinct. 128, Compound ovary of Hypericum, of carpels united below with distinct styles. 129, Ovary of another Hypericum of three carpels completely united. 130, Ovary of Flax; carpels five, united below, distinct above. 131, Dianthus (Pink). 132, Saxifraga.

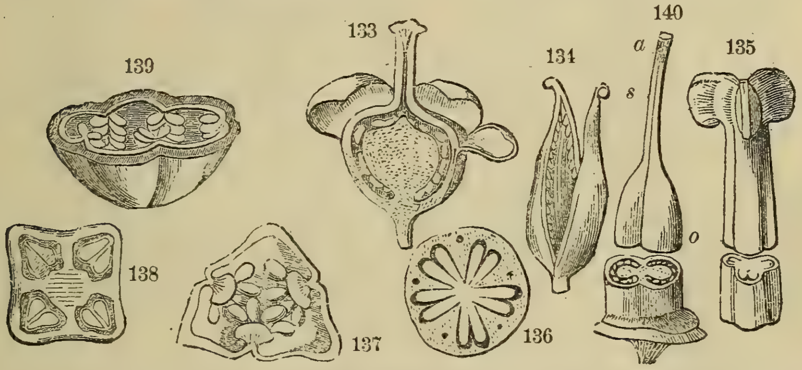
131. To determine the number of carpels in a compound ovary is an important and sometimes difficult matter. It may be known, first, by the number of the styles; or, by the number of the free stigmas (remembering that these organs are liable to be halved—§ 129); or 3d, by the lobes, angles, or seams of the ovary; or 4th, by the cells; or 5th, by the placentæ. But in Dodecatheon, etc., all these indications fail, so perfect is the union, and we are left to decide from analogy alone.

132. The student will notice two very diverse *modes of cohesion* in the carpels of the compound ovary. First and regularly, the carpels may each be closed, as when simple, and joined by their sides and fronts; as in St. Johnswort (129) and Lily (171). In this case, he may prove the following propositions. 1st. The compound ovary will have as many cells as carpels. 2d. The partitions between the cells will be double, and alternate with

the stigmas. 3d. A partition dividing the cell of a single carpel must be a *false* one; as occurs in Flax (136). 4th. The PLACENTÆ, as well as the ventral suture, will be *axial.*

133. Again: the carpels may each be open and conjoined by their edges, as are the petals of a gamopetalous corolla. So it is in the ovary of Violet (137) and Rock-rose (139). In this case, 1st. There will be no partition (unless a false one, as in the Crucifers), and but one cell; 2d. The *Placentæ* will be *parietal, i. e.*, on the wall of the cell (*paries*, a wall).

134. Between the two conditions of *axial* (or central) and *parietal placentæ*, we find all degrees of transition, as illustrated in the different species of St. Johnswort and in Poppy, where the inflected margins of the carpels carry the placentæ inward, well-nigh to the axis. Moreover, the placentæ are not always mere marginal lines, but often wide spaces covering large portions of the walls of the cell, as in Poppy and Water-lily: in other cases, as Datura (168), they become large and fleshy, nearly filling the cell.

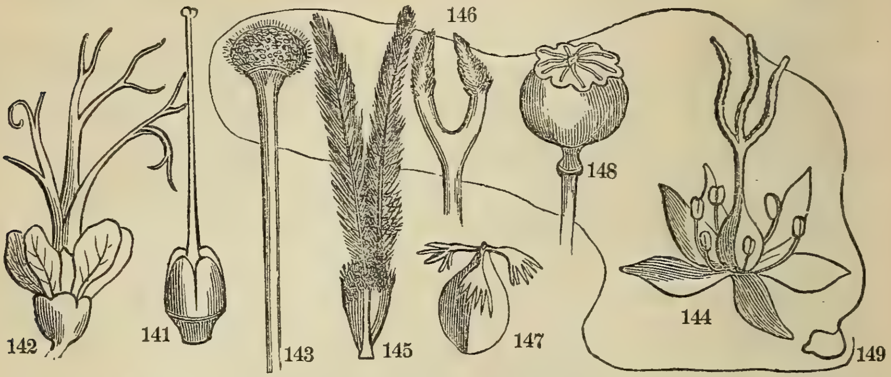


133, Samolus Valerandi, section of flower showing the free axial placenta. 134, Ovary of Scrophulariaceæ. 135, Ovary of Tulip. 136, Cross-section of ovary of Flax, 5-celled, falsely 10-celled. 137, Ovary of Violet, 1-celled. 138, Ovary of Fuchsia, 4-celled. 139, Ovary of Rock-rose, 1-celled, 5-carpelled. 140, Gentianaceæ, 2-valved, 1-celled.

135. *A free axial placenta*, without partitions, occurs in some compound one-celled ovaries, as in the Pink and Primrose orders (133). This anomaly is explained in two ways—first, by the obliteration of the early formed partitions, as is actually seen to occur in the Pinks; secondly, by supposing the placenta to be, at least in some cases, an *axial* rather than a marginal growth; that is, to grow from the point of the axis rather than from the margin of the carpellary leaf, for in Primrose no partitions ever appear.

136. A few peculiar forms of the style and stigma are worthy of note in our narrow limits, as the *lateral* style of Strawberry; the *basilar* style of the Labiatæ and Borrageworts; the branching style of Emblica, one of the Euphorbiaceæ; also the globular

stigma of Mirabilis; the linear stigma of Gyromia; the feathery stigma of Grasses; the filiform stigma of Indian corn; the lateral stigma of Aster; the petaloid stigmas of Iris; the hooded stigma of Violet (141–149).



Pistils.—141, Symphytum, basilar style, ovary 4-parted. 142, ♀ Flower of Emblica (Euphorbiaceæ), branching styles. 143, Mirabilis Jalapa, globular stigma. 144, Flower of Luzula, stigmas linear. 145, Feathery stigmas of a Grass. 146, Stigmas of Aster. 147, Rumex. 148, Poppy. 149, Filiform stigma of Zea Mays (Corn).

137. In the Pine, Cedar, and the Coniferæ generally, both the style and stigma are wanting; and the ovary is represented only by a flat, open, carpellary scale, bearing the naked ovules at its base.

Review.—123. What the Gynœcium regularly consists of. How it may vary. Variations in number. What is the meaning of trigynous, etc.? 125. How to know the simple pistil. Its members. Which is non-essential? Define the *carpel.* How it is folded. Proofs of the theory. Explain by figs. 124, 125. Define placentæ. The Pea-pod as a simple carpel. Describe the stigma. 130. Various degrees of union in the pistils. Six signs indicating the number of carpels. First mode of cohesion. Four *theorems.* Second mode. Two *theorems.* Explain the free axial placenta. Peculiar forms (141–149). 137. Stigma in the Pine.

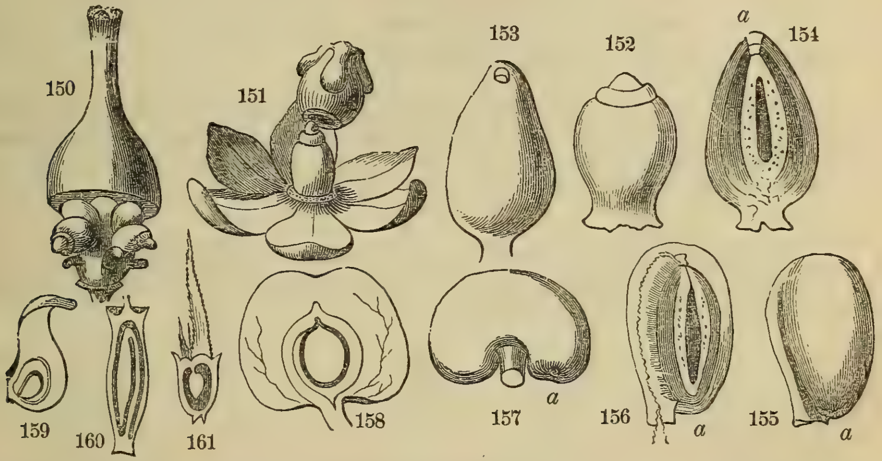
CHAPTER IX.

THE OVULES.

138. The ovules are understood to be *transformed buds*, destined to become seeds in the fruit. Their development from the margins and inner surface of the carpel favors this view; for the ordinary leaves of Bryophyllum and some other plants do habitually produce buds at their margin or on their upper surface; and in the Mignonette, ovules themselves have been seen transformed into leaves.

139. The number of ovules in the ovary varies from one to hundreds. Thus in Buttercups, Compositæ, and Grasses, the

ovule is *solitary;* in Umbelliferæ it is also solitary in each of the two carpels; in the Pea order they are *definite*, being but few; in Mullein and Poppy, *indefinite* (∞), too many to be readily counted. As to position, the ovule is *erect* when it grows upward from the base of the cell, as in Compositæ; *ascending*, when it turns upward from the side of the cell; *horizontal*, when neither turning upward nor downward; *pendulous*, when turned downward; and *suspended*, when growing directly downward from the top of the cell, as in Birch (158–161).



150, Pistil of Celosia; the pericarp detached, showing the young ovules. 151, Flower of Rhubarb; pericarp removed, showing the young ovule. 152, A similar ovule (orthotropous) of Polygonum. 153, The same, full grown; foramen at top. 154, Section showing its two coats, nucleus, and sac. 155, Anatropous ovule, as of Columbine; *a*, foramen. 156, Section of same. 157, Campylotropous ovule, as of Bean; *a*, foramen. 158, Section of a Cherry; ovule anatropous, suspended. 159, Section of carpel of Ranunculus; ovule ascending. 160, Senecio; ovule erect. 161, Hippuris; ovule pendulous.

140. The ovule at the time of flowering is soft and pulpy, consisting of a nucleus within two coats, supported on a stalk. The stalk is called *funiculus;* the point of its juncture with the base of the nucleus is the *chalaza.* The *nucleus* was first formed; then the *tegmen*, or inner coat, grew up from the chalaza and covered it; and lastly the outer coat, the *testa*, invested the whole. Both coats remain open at the top by a small orifice, the *foramen.*

141. In most cases the ovule, in the course of its growth, changes position—curving over in various degrees upon its lengthening funiculus or upon itself. When no such curvature exists, and it stands straight, as in the Buckwheat order, it is

orthótropous. It is *anátropous* when completely inverted. In this state a portion of the funiculus adheres to the testa, forming a ridge called *raphe*, reaching from the chalaza to the *hilum.* It is *campylótropous* when curved upon itself. In this state the foramen is brought near to the chalaza, and both are next the placenta, as in the Pinks and Cruciferæ; and *amphítropous* when half inverted, so that its axis becomes parallel with the placenta, as in Mallow. Here the raphe exists, but is short. In campylotropous there is no raphe.

142. The ovule contains no young plant (embryo) yet; but a cavity, the *embryo sac*, is already provided to receive it just within the upper end of the nucleus.

The relations of the ovule to the pollen grain will be more suitably discussed hereafter, under the head of fertilization. We briefly remark here that the immediate contact of the two is brought about, at the time of flowering, by special arrangements; and that, as the undoubted result of their combined action, the embryo soon after originates in the embryo sac.

Review.—138. Nature of the ovules. 139. How many? Five terms indicative of their position. What is funiculus?—Chalaza? How the ovule develops. An orthotropous ovule. Anatropous. Two other similar terms. 142. What provision for the coming embryo? Relation to the pollen grain.

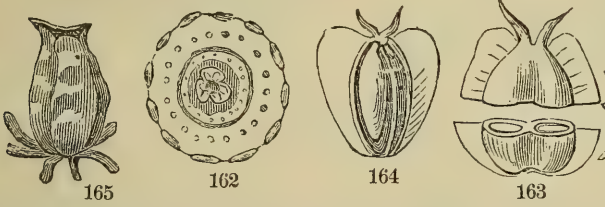
CHAPTER X.

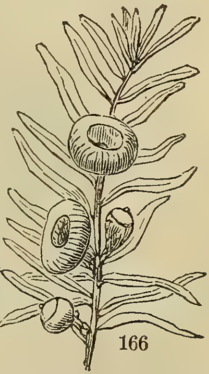
THE FRUIT.—PERICARP.

143. After having imbibed the pollen which the anthers have discharged, the pistil or its ovary continues its growth and enlargement, and is finally matured in the form of the peculiar fruit of the plant. The fruit is, therefore, properly speaking, *the ovary brought to perfection.*

144. As to the other organs of the flower, having accomplished their work—the fertilization of the ovary—they soon wither and fall away. Some of them, however, often persist, to protect or become blended with the ripening fruit. Thus the tube of the *superior* calyx (§ 97) always blends with the ovary in fruit; as in Currant, Cucumber, Apple, etc. In Compositæ, the persistent limb enlarges into the pappus of the fruit. In Buttercups, the fruit is beaked with the short, persistent *style.* In Clematis and Geum, it is *caudate* (tailed) with the long, growing *style.* In the Potato tribe, Labiatæ, and many others, the *inferior calyx* continues to vegetate like leaves until the fruit ripens. In some cases the fruit, so called, consists of the receptacle and ovaries blended; as in Blackberry and Strawberry. Again—in Mulberry, Fig, and Pineapple, the whole inflorescence is consolidated into the matured fruit.

145. As a rule, the structure of the fruit agrees essentially with that of the ovary. In many cases, however, the fruit undergoes such changes in the course of its growth from the ovary as to disguise its real structure. An early examination, therefore, is always more reliable in its results than a late one. For example, the Oak-acorn is a fruit with but one cell and one seed, although its ovary had three cells and six ovules! This singular change is due to the non-development of five of its ovules, while the sixth grew the more rapidly, obliterated the partitions by pressing them to the wall, and filled the whole space itself. Similar changes characterize the Chestnut, Hazelnut, and that whole Order. The ovary of the Birch is 2-celled, 2-ovuled; but by the suppression of one cell with its ovule, the fruit becomes 1-celled and 1-seeded.





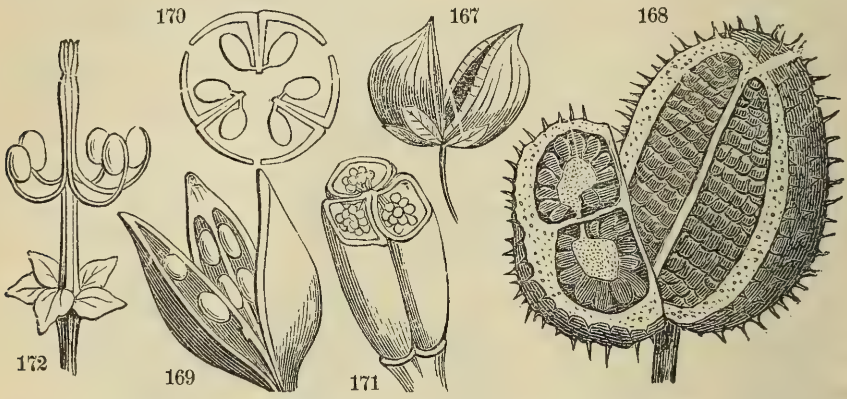
162, Section of the ovary of an Acorn, 3-celled, 6-ovuled. 163, Section of ovary of Birch, 2-celled, 2-ovuled. 164, Vertical section of the same in fruit. 165, Pericarp of Mignonette open soon after flowering. 166, Naked seed of Taxus Canadensis, surrounded, not covered, by the fleshy pericarp.

On the other hand, the cells are sometimes multiplied in the fruit by the formation of false partitions. Thus the pod of Thornapple (Datura) becomes 4-celled from a 2-celled ovary; and the longer pods of some Leguminous plants have cross-partitions formed between the seeds.

146. **The Pericarp.** The fruit consists of the pericarp and the seed. The pericarp (περί, around) is the envelope of the seeds, consisting of the carpels and whatever other parts they may be combined with. It varies greatly in texture and substance when mature, being then either dry, as the Pea-pod, or *succulent*, as the Currant. Dry pericarps are *membranous*, or *coriaceous* (leathery), or *woody*. Succulent pericarps may be either wholly so, as the Grape, or partly so, as the Peach and other stone fruit.

147. With very few exceptions the pericarp encloses the seed while maturing. In Mignonette (165), however, it opens, ex-

posing the seed, immediately after flowering. The membranous pericarp of Cohosh (Leontice) falls away early, leaving the seed to ripen naked. In Yew (Taxus) the seed is never enclosed wholly by its fleshy pericarp; but in most of the other Coniferæ, the close-pressed, carpellary scales cover the seeds. One-seeded fruits, like those of Butter-cups, etc., are liable to be mistaken for naked seeds.



Capsule, 167, of Scrophularia, 2-celled; 168, of Datura Stramonium; 169, of Iris; 170, showing its mode of dehiscence (loculicidal). 171, of Colchicum, 3-celled. 172, Regma, ripe fruit of Geranium, the carpels (cocci) separating from the axis and bending upward on the elastic styles.

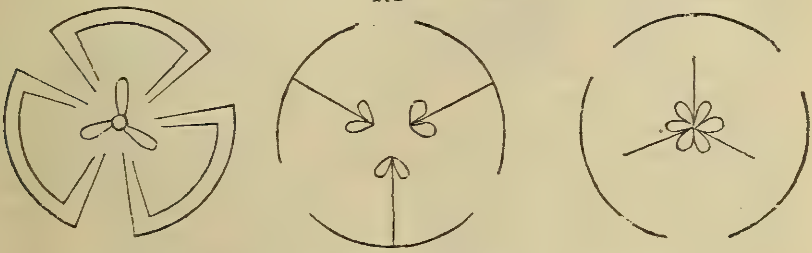
148. **Dehiscence.** The fleshy pericarp is always *indehiscent.* Its seeds are liberated only by its decay, or bursting in germination. So also in many cases the dry pericarp, as the acorn. But more commonly the dry fruit, when arrived at maturity, opens in some way, discharging its seeds. Such fruits are dehiscent. Dehiscence is either valvular, porous, or circumscissile; *valvular*, when the pericarp opens vertically along the sutures, forming regular parts called *valves.* These valves may separate quite to the base, or only at the top, forming teeth, as in Chickweed. We notice four modes of valvular dehiscence, viz.:

1, *Sutùral*, when it takes place at the sutures of any 1-celled pericarp, as Columbine, Pea, Violet.

2, *Septícidal* (*septum*, partition, *cædo*, to cut), when it takes place through the dissepiments (which are double, § 132). The carpels thus separated may open severally by sutures (Mallows), or remain indehiscent, as in Vervain.

3, *Loculícidal* (*loculus*, a cell, *cædo*, to cut), when each carpel opens at its dorsal suture directly into the cell (Evening Primrose, Lily). Here the dissepiments come away attached to the middle of the valves.

4. *Septifragal* (*septum*, and *frango*, to break), when the valves separate from the dissepiments which remain still united in the axis (Convolvulus.)



Dehiscence; 173, septicidal; 174, loculicidal; 175, septifragal.

149. *Porous* dehiscence is exemplified in the Poppy, where the seeds escape by orifices near the top of the fruit. It is not common. *Circumscissile* (*circumscindo*, to cut around), when the top of the ovary opens or falls off like a lid, as in Jeffersonia, Henbane, Plantain. Some fruits, as the Gerania and Umbelliferæ, are furnished with a *carpophore*, that is, a slender column from the receptacle—a *fusiform torus*, prolonged through the axis of the fruit, supporting the carpels.

Review.—143. Origin of the fruit. Death of the flower. What parts may survive?—In Apple? Geum? Potato? Strawberry? 145. A rule and an exception. Instance in Oak—Birch. What change in Thornapple? 146. Constituents of the fruit. Etymology of pericarp. Texture. 147. Open pericarps. 148. What is dehiscence and indehiscence. Three general modes of dehiscence. Four modes of valvular dehiscence. 149. Define Porous dehiscence—Circumscissile. What is a carpophore? Illustrate by 172, 177.

CHAPTER XI.

FORMS OF THE PERICARP.

150. The morphology of the pericarp is exceedingly diversified; but it will suffice the learner at first to acquaint himself with the leading forms only, such as are indicated in the following synopsis and more definitely described afterward.

The following is a synopsis of the principal forms of Pericarps, for the blackboard.

§ 1. *Free Fruits* (*formed by a single Flower*).

* **Pericarps indehiscent.**	
† With usually but one seed, and	
‡ Uniform, or 1-coated.	
1. Separated from the seed.	Achenium (Buttercups).
2. Inflated, often breaking away.	Utricle (Pigweed).
3. Inseparable from the seed.	Caryopsis (Grasses).
4. Invested with a cupule (involucre).	Glans (Oak).
5. Having winged appendages.	Samara (Ash).
‡ Double or triple-coated, fleshy or fibrous.	
6. Three-coated. Stone cell entire.	Drupe (Cherry).
7. Two-coated. Stone cell 2-parted.	Tryma (Walnut).
8. Drupes aggregated.	Etærio (Raspberry).
† With two or more seeds,	
‡ Immersed in a fleshy or pulpy mass.	
9. Rind membranous.	Berry (Gooseberry).
10. Rind leathery, separable.	Hesperidium (Orange).
11. Rind hard, crustaceous.	Pepo (Squash).
‡ 12. Inclosed in distinct cells.	Pome (Apple).
* **Pericarps dehiscent.**	
† 13. Dehiscence circumscissile, seeds ∞.	Pyxis (Henbane).
† Dehiscence valvular or porous;	
‡ Simple, or 1-carpelled,	
14. Opening by the ventral suture.	Follicle (Columbine).
15. Opening by both sutures.	Legume (Pea).
16. Legume jointed.	Loment (Desmodium).
‡ Compound pericarps;	
17. Placentæ parietal with two cells.	Silique (Mustard).
Silique short.	Silicle (Shepherd's Purse).
18. Placentæ parietal only when 1-celled.	Capsule (Flax).
19. Capsule with carpophore and elastic styles.	Regma (Geranium).

§ 2. *Confluent Fruits* (*formed of an Inflorescence*).

* 20. With open carpels aggregated into a cone.	Strobile (Pine).
* 21. With closed carpels aggregated into a mass.	Sorosis (Pineapple.)

151. The *achenium* is a small, dry, indehiscent pericarp, free from the one seed which it contains, and tipped with the remains of the style (Buttercups, Lithospermum).

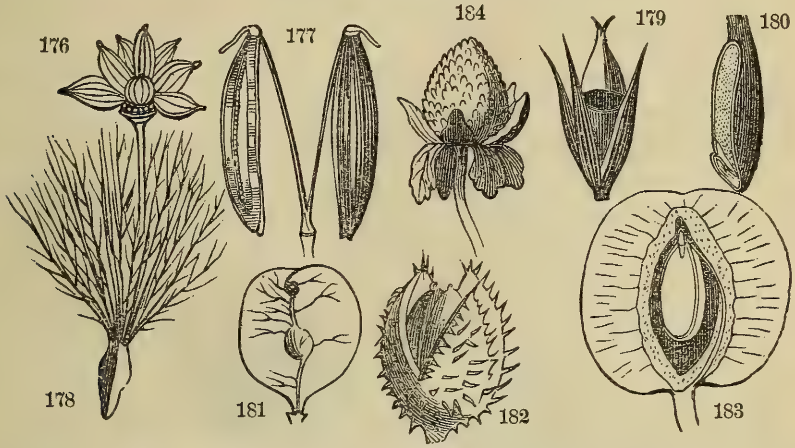
The double achenium of the Umbelliferæ, supported on a *carpophore*, is called cremocarp (177). The 2-carpelled achenium of the Compositæ, usually crowned with a pappus, is called *cypsela* (178).

The achenia are often mistaken for seeds. In the Labiatæ and Borrageworts they are associated in fours (141). In Geum, Anemone, etc., they are collected in heads. The rich pulp of the Strawberry consists wholly of the overgrown receptacle, which bears the dry achenia on its surface (184).

152. The *utricle* is a small, thin pericarp, fitting loosely upon its one seed, and often opening transversely to discharge it (Pigweed, Prince's Feather).

153. *Caryopsis*, the grain or fruit of the Grasses, is a thin, dry, 1-seeded pericarp, inseparable from the seed.

154. *Samara;* dry, 1-seeded, indehiscent, furnished with a membranous wing or wings (Ash, Elm, Maple).



176, Achenia of Anemone thalictroides. 177, Cremocarp of Archangelica officinalis, its halves (mericarps) separated and suspended on the carpophore. 178, Cypsela of Thistle with its plumous pappus. 179, Utricle of Chenopodium (Pigweed). 180, Caryopsis of Wheat. 181, Samara of Elm. 182, Glans of Beech. 183, Drupe of Prunus. 184, Fruit of Fragaria Indica, a fleshy torus like the Strawberry.

155. *Glans*, or *nut;* hard, dry, indehiscent, commonly 1-seeded by suppression (§ 145), and invested with a persistent involucre called a cupule, either solitary (Acorn, Hazelnut) or several together (Chestnut, Beechnut).

156. *Drupe*, stone-fruit; a 3-coated, 1-celled, indehiscent pericarp, exemplified in the Cherry and Peach. The outer coat (epidermis) is called the epicarp; the inner is the nucleus or endocarp, hard and stony; the intervening pulp or fleshy coat is the sarcocarp (σάρξ, flesh). These coats are not distinguishable in the ovary.

157. *Tryma*, a kind of dryish drupe, 2-coated; the epicarp fibro-fleshy (Butternut) or woody (Hickory); the nucleus bony, with its cell often deeply 2-parted (Cocoanut).

158. *Etærio*, an aggregate fruit consisting of numerous little drupes united to each other (Raspberry) or to the fleshy receptacle (Blackberry).

159. *Berry*, a succulent, thin-skinned pericarp, holding the seeds loosely imbedded in the pulp (Currant, Grape).

160. *Hesperidium*, a succulent, many-carpelled fruit; the rind

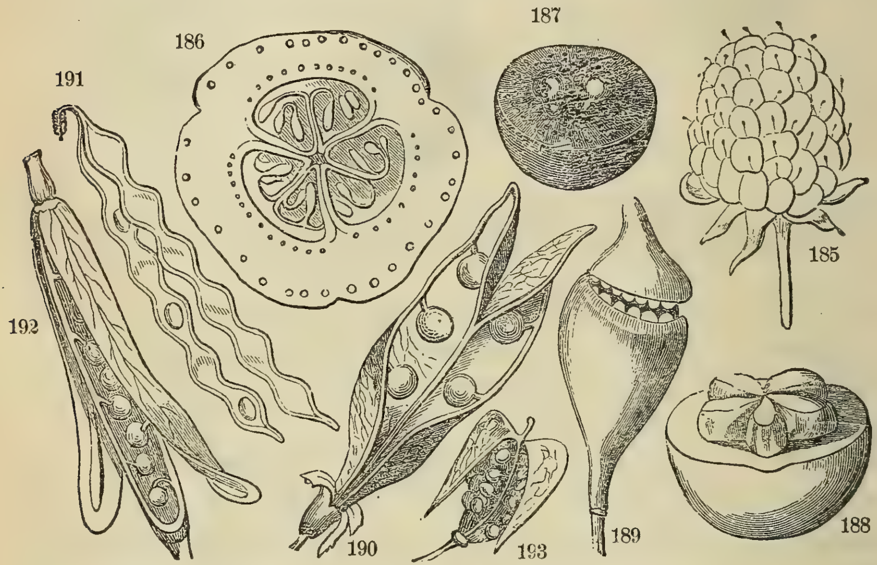
thick, leathery, separable from the pulpy mass within (Orange, Lemon).

161. *Pepo*, an indehiscent, compound, fleshy fruit, with a hardened rind and parietal placentæ (Melon).

162. The *pome* is a fleshy, indehiscent pericarp, formed of the permanent calyx, containing several cartilaginous (Apple) or bony (Haw) cells.

163. The *pyxis* is a many-seeded, dry fruit, opening like a lid by a circumscissile dehiscence (Plantain, Henbane, Jeffersonia).

164. The *follicle* is a single carpel, 1-celled, many-seeded, opening at the ventral suture (Columbine, Larkspur, Silk-grass).



Fruits.—185, Etærio of Rubus strigosus (Blackberry). 186, Pepo; section of Cucumber. 187, Berry, Grape. 188, Pome, Cratægus (Haw). 189, Pyxis of Jeffersonia. 190, Legume of Pea. 191, Loment of Desmodium. 192, Silique of Mustard. 193, Silicle of Capsella.

165. The *legume*, or pod, is a single carpel, 1-celled, usually splitting into two valves, but bearing its 1—∞ seeds along the ventral suture only, in one row, as in the Bean and all the Leguminosæ. It is sometimes curved or coiled like a snail-shell (Medicago). The *loment* is a jointed pod, separating across into 1-seeded portions (Desmodium).

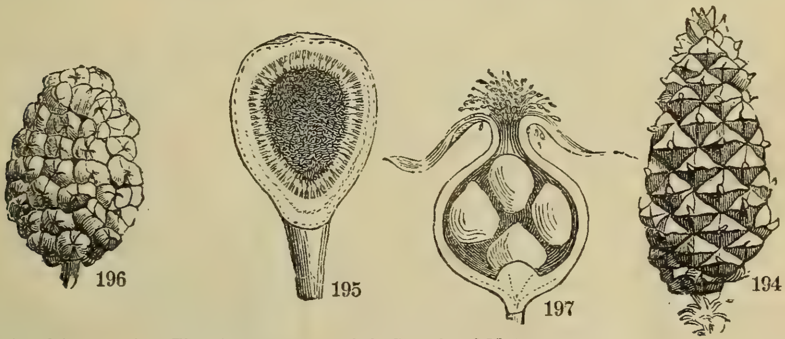
166. *Silique.* This is also a pod, linear, 2-carpelled, 2-valved, 2-celled by a false dissepiment extended between the two parietal placentæ. To this false dissepiment on both sides of both

edges the seeds are attached (Mustard). The *silicle* is a short silique, nearly as wide as long (Shepherd's Purse). The silique and silicle are the peculiar fruit of all the Cruciferæ.

167. *Capsule* (casket.) This term includes all other forms of dry, dehiscent fruits, compound, opening by as many valves as there are carpels (Iris), or by twice as many (Chickweed), or by pores (Poppy).

168. The *Regma* is a kind of capsule like that of the Geranium, whose dehiscent carpels separate elastically, but still remain attached to the carpophore.

169. *Strobile*, or *Cone;* an aggregate fruit consisting of a conical or oval mass of imbricated scales, each an open carpel (♀ flower), bearing seeds on its inner side at base, *i. e.*, axillary seeds (Pine and the Gymnosperms generally). The *Cone* (*syncarpium*, σὺν, together) of the Magnolia tribe is a mass of confluent, closed pericarps on a lengthened torus (Cucumber Tree).



194, Strobile of Pinus. 195, The Fig (syconus). 196, Sorosis of Mulberry. 197, Hip of Rosa, achenia nearly enclosed in the leathery calyx tube.

170. The *Fig* (syconus) is an aggregate fruit, consisting of numerous seed-like pericarps enclosed within a hollow, fleshy receptacle, where the flowers were attached.

171. Other confluent fruits (*Sorosis*) consist of the entire inflorescence developed into a mass of united pericarps, as in the Mulberry, Osage-orange, Pineapple.

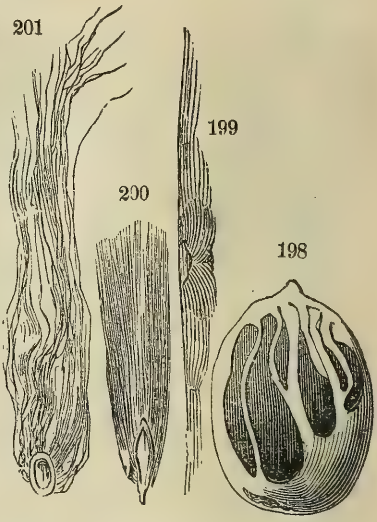
Review.—150. Name the first division of fruits. Free fruits, how subdivided? Name the five indehiscent, 1-seeded, 1-coated fruits. How do we distinguish them? Name the three indehiscent, 1-seeded, several-coated fruits. Difference between drupe and tryma? —Etærio? Name the four indehiscent, several-seeded fruits. How does pome differ from the others? Are the dehiscent pericarps fleshy or dry? Distinguish the Pyxis. Name three *simple* fruits which open by valves. Distinguish them. Name four *compound*, opening fruits. What is the fruit of Mustard, etc.? Find all the figures. The subdivision of confluent fruits, etc., etc.

CHAPTER XII.

THE SEED.

172. The seed is the perfected ovule, having an embryo formed within, which is the rudiment of a new plant similar in all respects to the original. The seed consists of a *nucleus* or kernel invested with the integuments or coverings. The outer covering is the *testa*, the inner the *tegmen*, as in the ovule. The latter is thin and delicate, often indistinguishable from the testa.

173. **The testa** is either membranous (papery), coriaceous (leathery), crustaceous (horny), bony, woody, or fleshy. Its surface is generally smooth, sometimes beautifully polished, as in Columbine, Indian-shot (Canna), and often highly colored, as in the Bean; or it may be dull and rough. It is sometimes winged, as in Catalpa, and sometimes clothed with long hairs, as in Silk-grass (Asclepias). Such a vesture is called the *Coma*. Cotton is the coma of the Cotton-seed.



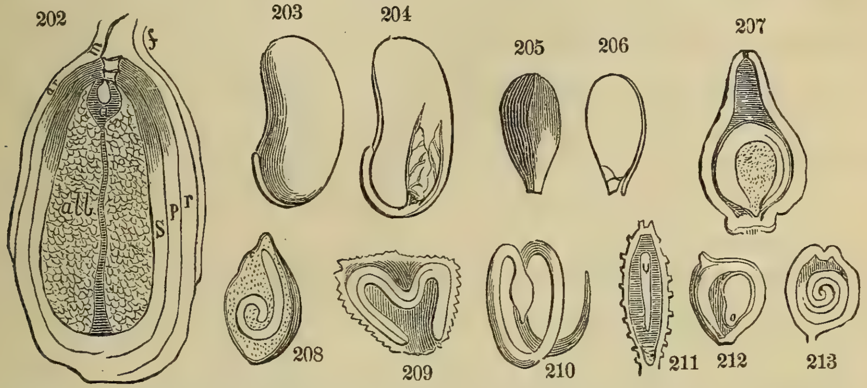
198, Aril of Nutmeg (mace). 199, Seed of Catalpa. 200, Seed of Willow. 201, Seed of Cotton.

174. The coma must not be confounded with the pappus (§ 104), which is a modification of the calyx, appended to the pericarp, and not to the seed, as in the achenia of the Thistle, Dandelion, and other Compositæ. Its intention in the economy of the plant cannot be mistaken; serving like the pappus to secure the dispersion of the seed, while incidentally as it were, in the case of the Cotton-seed, it furnishes clothing and employment to a large portion of the human race.

175. **The aril** is an occasional appendage, partially or wholly investing the seed. It originates after fertilization, at or near the hilum, where the seed is attached to its stalk (funiculus). Fine examples are seen in the gashed covering of the Nutmeg, called mace, and in the scarlet coat of the seed of Staff-tree. In the seed of Polygala, etc., it is but a small scale, entire or 2-cleft, called *caruncle*.

176. The position of the seed in the pericarp is, like that of the ovule, *erect*, *ascending*, *pendulous*, etc. (§ 149). Likewise in respect to its inversions, it is *orthótropous*, *anátropous*, *amphítropous*, and *campylótropous* (§ 141), terms already defined. The anátropous is by far the most common condition.

177. **The hilum** is the scar or mark left in the testa of the seed by its separation from the funiculus. It is commonly called the *eye*, as in the Bean. In orthótropous and campylótropous seeds, the hilum corresponds with the chalaza (§ 140). In other conditions it does not; and the raphe (§ 141) extends between the two points, as in the ovules. The foramen of the ovule is closed up in the seed, leaving a slight mark—the *micropyle.*



202, Seed of Water Lily (Nymphæa), enlarged section; *alb.*, albumen; *a*, the embryo contained in the embryo-sac; *s*, tegmen; *p*, testa; *r*, raphe; *ar*, aril; *m*, orifice; *f*, funiculus. 203, Seed of Bean. 204, Same, one cotyledon with the leafy embryo. 205, Seed of Apple. 206, One cotyledon showing the raphe and embryo. 207, Fruit of Mirabilis; embryo coiled into a ring. 208, Onion; embryo coiled. 209, Convolvulus; leafy embryo folded. 210, Embryo of Cuscuta. 211, Typha. 212, Ranunculus. 213, Hop.

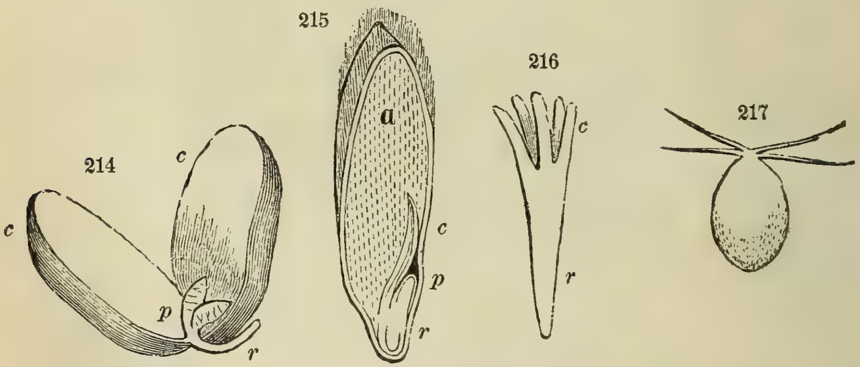
178. The seed-kernel may consist of two parts, the embryo and albumen, or of the embryo only. In the former case the seeds are *albuminous;* in the latter, *exalbuminous;* a distinction of great importance in systematic botany.

179. **The albumen** is a starchy or farinaceous substance accompanying the embryo and serving as its first nourishment in germination. Its qualities are wholesome and nutritious, even in poisonous plants. Its quantity, when compared with the embryo, varies in every possible degree; being excessive (Ranunculaceæ), or about equal (Violaceæ), or scanty (Convolvulaceæ), or none at all (Leguminosæ). In texture it is mealy in Wheat, mucilaginous in Mallows, oily in Ricinus, horny in Coffee, ruminated in Nutmeg and Pawpaw, ivory-like in the Ivory-palm (Phytelephas), fibrous in Cocoanut, where it is also hollow, enclosing the milk.

180. **The embryo** is an organized body, the rudiment of the future plant, consisting of root (*radicle*), stem-bud (*plumule*),

and leaves (*cotyledons*). But these parts are sometimes quite undistinguishable until germination, as in the Orchis tribe. The *Radicle* is the descending part of the embryo, always pointing toward the micropyle, the true vertex of the seed. The *Plumule* is the germ of the ascending axis, the terminal bud, located between or at the base of the *Cotyledons.* These are the seed-lobes, the bulky farinaceous part of the embryo, destined to become the first or seminal leaves of the young plant. The nutritive matter deposited in the seed for the early sustenance of the germinating embryo, is found more abundant in the cotyledons in proportion as there is less of it in the albumen—often wholly in the albumen (Wheat), again all absorbed in the bulky cotyledons (Squash).

181. The number of the cotyledons is variable; and upon this circumstance is founded the most important subdivision of the *Flowering Plants.* THE MONOCOTYLEDONS are plants bearing seeds with one cotyledon; or if two are present, one is minute or abortive. Such plants are also called ENDOGENS, because their stems grow by internal accretions (§ 421). Such are the Grasses, the Palms and Lilies, whose leaves are mostly constructed with parallel veins.



214, Dicotyledonous (Bean). 215, Monocotyledonous (Wheat). 216, Polycotyledonous (Pine). 217, Acotyledonous (zóospore of one of the Confervæ). (*r*, *r*, *r*, radicle; *p*, *p*, *p*, plumule; *c*, *c*, *c*, cotyledon; *a*, albumen.)

182. THE DICOTYLEDONS are plants bearing seeds with two cotyledons. These are also called EXOGENS, because their stems grow by external accretions; including the Bean tribe, Melon tribe, all our forest trees, etc. These are also distinguished at a

glance by the structure of their leaves, which are net-veined (§ 280). More than two cotyledons are found in the seeds of Pine and Fir; while the Dodder is almost the only known example of an embryo with no cotyledon.

183. The position of the embryo, whether with or without albumen, is singularly varied and interesting to study. It may be *straight*, as in Cat-tail and Violet, or *curved* in various degrees (Moonseed and Pink), or *coiled* (Hop), or *rolled* (Spice-bush), or *bent* angularly (Buckwheat), or *folded* (Cruciferæ). In the last case two modes are to be specially noticed. 1, *Incumbent*, when the cotyledons fold over so as to bring the back of one against the radicle (Shepherd's Purse); 2, *accumbent*, when the edges touch the radicle (Arabis).

184. A few plants, as the Onion, Orange, and Coniferæ, occasionally have two or even several embryos in a seed; while all the Cryptogamia or flowerless plants have no embryo at all, nor even seeds, but are reproduced from *spores*—bodies analogous to the pollen-grains of flowering plants (217).

185. **Vitality of the seed.** After the embryo has reached its wonted growth in the ripened seed, it becomes suddenly inactive and torpid, yet still alive. In this condition it is, in fact, *a living plant, safely packed and sealed up for transportation.* This suspended vitality of the seed may endure for years, or even, in some species, for ages. The seeds of Maize and Rye have been known to grow when 30 to 40 years old; Kidney-beans when 100; the Raspberry after 1700 years (Lindley). Seeds of Mountain Potentilla (P. tridentata) were known to us to germinate after a slumber of 60 years. On the other hand, the seeds of some species are short-lived, retaining vitality hardly a year (Coffee, Magnolia).

186. **The dispersion of seeds** over wide, and often to distant regions, is effected by special agencies, in which the highest Intelligence and Wisdom are clearly seen. Some seeds made buoyant by means of the coma or pappus, already mentioned, are wafted afar by the winds, beyond rivers, lakes, and seas; as the Thistle and Dandelion. Other seeds have wings for the same purpose. Others are provided with hooks or barbs, by which they lay hold of men and animals, and are thus, by unwilling agents, scattered far and wide (Burr-seed, Tick-seed). Again: some seeds, destitute of all such appendages, are thrown to a distance by the sudden coiling of the elastic carpels (Touch-me-not). The Squirting-cucumber becomes distended with water by absorption, and at length, when ripe, bursts an aperture at the base by separating from the stem, and projects the mingled seeds and water with amazing force.

187. Rivers, streams, and ocean currents, are agents for transporting seeds from country to country. Thus the Cocoa, and the Cashew-nut, and the seeds of Mahogany, have

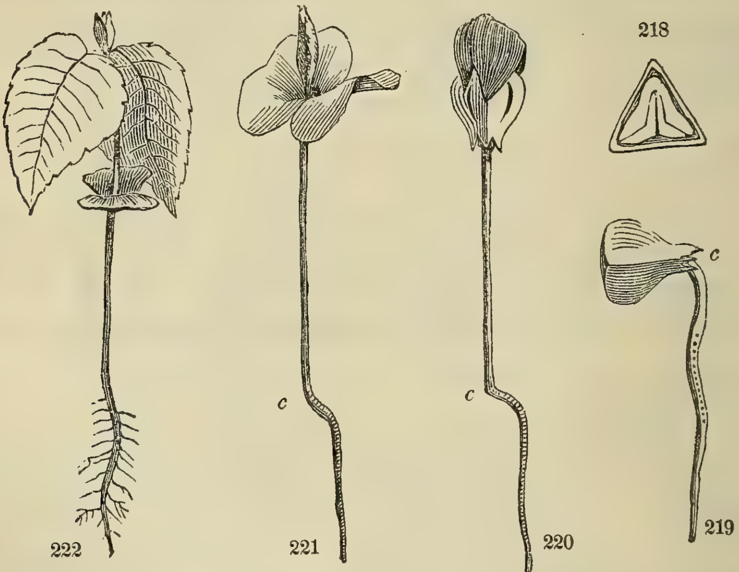
been known to perform long voyages without injury to their vitality. Squirrels laying up their winter stores in the earth; birds migrating from clime to clime and from island to island, in like manner conspire to effect the same important end.

Review.—172. What is the seed? Its two coverings. 173. The texture of the testa. Its appendages. What is cotton? 174. Distinguish coma from pappus. 175. What is the aril? 176. Positions of the seed in the cell. When is a seed anátropous?—Orthótropous? etc. 177. Define hilum. When does a raphe exist? What is the micropyle? 178. Constituents of an albuminous seed—Exalbuminous. 179. Varying proportions of albumen. Various texture. 180. Distinguish the three parts of the embryo. Where is the food for the embryo? 181. Distinguish the Monocotyledonous Plants. 182. The Dicotyledonous. 183. Position of the embryo in the seed of Violet?—Of Pink?—Hop?—Shepherd's Purse?—Arabis? 185. Vitality of the seed. 186. Special arrangements for their dispersion.

CHAPTER XIII.

GERMINATION.

188. The recommencement of growth in the seed is called *germination.* It is the awakening of the embryo from its torpor, and the beginning of development in its parts already formed, so as to become a plant like its parent.

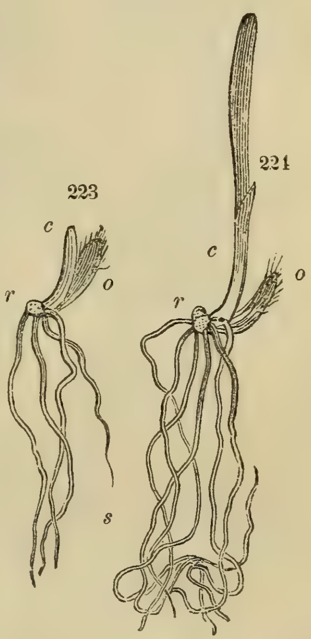


Germination of the Beechnut.—218, Cross-section, showing the folded cotyledons. 219, The radicle only. 220. The ascending axis, above *c*, appears. 221, The cotyledons expand into the primordial leaves. 222, The first true leaves.

189. All the stages of this interesting process may be conveniently observed, at any season, by an experiment. Let a few seeds, as of flax, cotton, wheat, pea, be enveloped in a lock of cotton resting upon water in a bulb-glass, and kept constantly at a proper temperature. Or, in Spring, the garden-soil will give us examples of all kinds everywhere.

190. That the seed may begin to grow, or germinate, it is first *planted;* or, at least, placed in contact with warm, moist soil. Concerning the proper depth of the planted seed, agriculturists are not agreed; but nature seems to indicate that no covering is needed beyond what will secure the requisite moisture and shade. Thus situated, the integuments gradually absorb water, soften, and expand. The insoluble, starchy matter deposited in the cotyledons, or in the albumen, or in both, undergoes a certain chemical change, becoming sweet and soluble, capable of affording nourishment to the embryo now beginning to dilate and develop its parts. First (in the winged seed of the Maple, scattered everywhere) the radicle is seen protruding from the micropyle, or the bursting coverings. A section of this seed would now show the folded embryo, impatient of confinement (225).

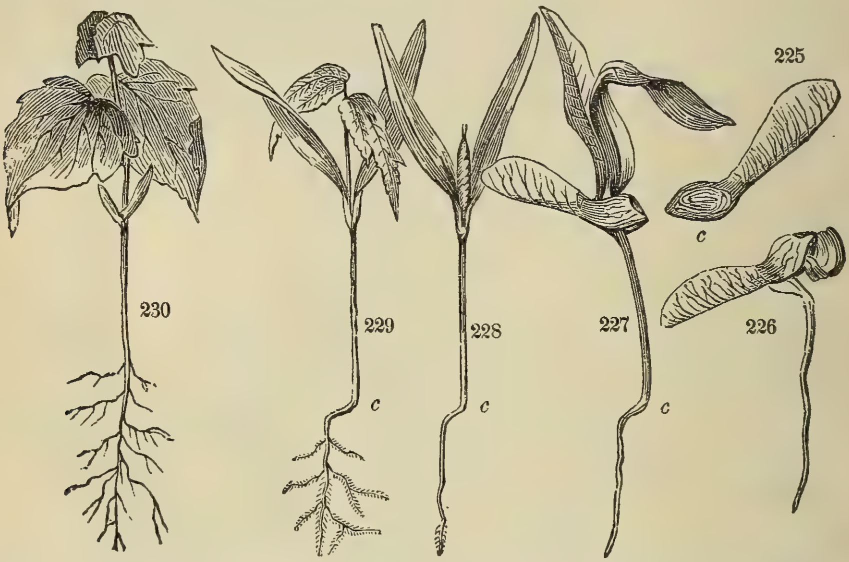
191. Soon after, the radicle has extended; and, pale in color, has hidden itself in the dark damp earth. Now the cotyledons, unfolding and gradually freed from the seed-coats, display themselves at length as a pair of green leaves. Lastly the plumule appears in open air, a green bud, already showing a lengthening base, its first internode, and soon a pair of regular leaves, lobed as all Maple-leaves. The embryo is now an embryo no longer, but a growing plant descending by its lower axis, ascending and expanding by its upper.



Germination of Wheat.—*o*, the grain, containing the cotyledon; *c*, plumule; *r*, radicle; *s*, rootlets (adventitious).

192. With equal advantage we may watch the germination of the Beech, represented in the figures above; or of the Oak, as displayed in figures 1, 2, 3, 4; or the Pea, or Squash, and other Dicotyledons; and the chief difference observed among them will be in *the disposal of the cotyledons.* In general, these arise with the ascending axis, as in Maple and Bean, and act as the

first pair of leaves. But sometimes when they are very thick, as in Pea, Buckeye, and Oak, they never escape the seed-coats, but remain and perish at the collum (§ 199), neither ascending nor descending.



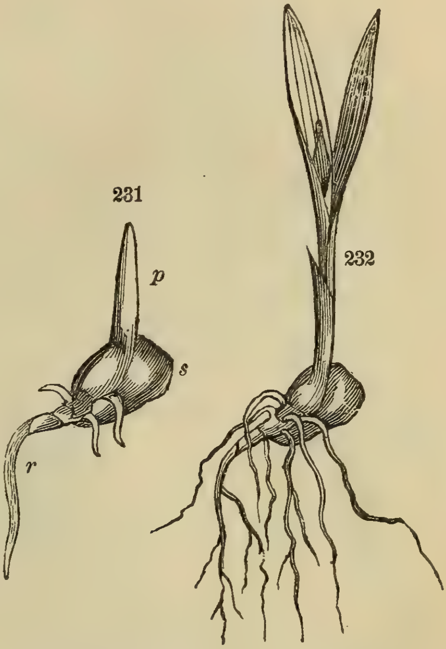
Germination of the Maple.—225, Samara; section showing the folded cotyledons at *c*. 226–230, Progressive stages.

193. The germination of MONOCOTYLEDONS, as seen in Indian Corn, Wheat, and Tulip, is in this wise. The cotyledon is not disengaged from the seed, but remains stationary with it. The radicle (*r*) protrudes slightly, and one or more rootlets (*s*) break out from it and descend. The plumule (*c*) shoots at first parallel with the cotyledon along the face of the seed, but soon ascends, pushing out leaf from within leaf.

194. The conditions requisite for germination are moisture, air, and warmth. *Moisture* is necessary for softening the integuments, dissolving the nutritive matter, and facilitating its circulation. This is supplied in the rain and dew. *Air*, or rather its oxygen, is required for the conversion of the starch into sugar,—a process always depending upon oxidation. The oxygen absorbed unites with a portion of the carbon of the starch, producing heat, evolving carbonic acid, and thus converting the remainder into grape-sugar, soluble and nutritive.

195. *Warmth* is a requisite condition of all vital action, as

well in the *sprouting* of a seed as in the *hatching* of an egg. The proper degree of temperature for our own climate may be stated at 60° to 80°. Extremes of heat and of cold are not, however, fatal to all germination. In one of the Geysers of Iceland, which was hot enough to boil an egg in four minutes, a species of Chara was found in a growing and fruitful state. The hot springs and pools of San Bernardino, California, at the constant heat of 190°, have several species of plants growing within their waters. Many species also arise and flower in the snows of Mt. Hood, along their lower borders. *Darkness* is favorable to germination, as proved by experiment, but not an indispensable condition. Hence, while the seed should be covered, for the sake of the moisture and shade, the covering should be thin and light, for the sake of a free access to air.



231, 232, Germination of Indian Corn.

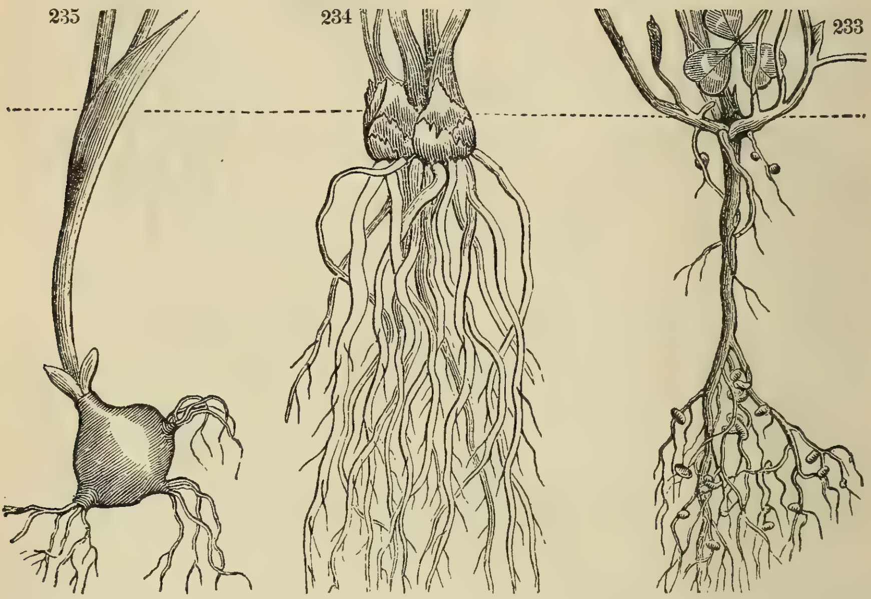
196. The cause of the downward tendency of the root is a theme of much discussion. Some have referred it to the principle of gravitation; others to its supposed aversion to light. But it is a simple and satisfactory explanation that its growth or cell-development takes place most readily on the moist side of its growing-point, and consequently in a downward direction, so long as the soil in contact with its lower surface is more moist than that above. Hence, also, the well-known tendency of roots toward springs and water-courses.

Review.—188. Define the term Germination. 189. Where and when to observe the process. How at other seasons. 190. Prerequisites to germination. Depth of planting. What change in the material of the seed? State of the embryo in 225?—In 226?—In figs. 227–230? 191. What becomes of the radicle?—Of the cotyledons? How does the plumule develop? Show by the figures. In what plants do the cotyledons remain stationary? 193. Show how the Monocotyledons germinate, by figs. 231, 232. 195. Three conditions requisite. Why is moisture needed? Why air? Whence comes the sugar? 195. What degrees of warmth? Some strange exceptions. 196. Why the root grows downward.

CHAPTER XIV.

THE ROOT, OR DESCENDING AXIS.

197. **The Root** is the basis of the plant, and the principal organ of nutrition. It originates with the radicle of the seed, the tendency of its growth is downward, and it is generally immersed in the soil. Its *office* is twofold; viz., to support the plant in its position, and to imbibe from the soil the food necessary to the growth of the plant.

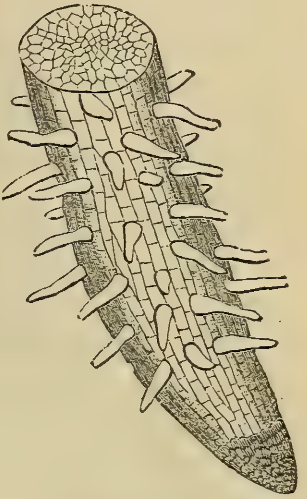


233, White Clover—an axial root (with minute tubers). 234, Buttercups—fibrous roots, inaxial. 235, Erigenia—root tuberous.

198. The leading propensity of the root is to divide itself; and its only normal appendages are branches, branchlets, fibres, and fibrillæ, which are multiplied to an indefinite extent, corresponding with the multiplication of the leaves, twigs, &c., above. This at once insures a firm hold upon the earth, and brings a large absorbing surface in contact with the moist soil.

199. The summit of the root, or that place where the root

meets the stem, is called the *collum;* the remote, opposite extremities, the ends of the fibres, being chiefly active in absorption, are the *spongioles.* Neither of these terms denotes distinct organs, but places only, and are often convenient. The *fibrils*, or *fibrillæ*, are those minute hairs (seen only with a lens) which clothe the younger fibres. They arise from the tender epidermis or skin, and perish when that thickens into bark. These are the efficient absorbers of liquid nourishment. They are developed and perish annually with the leaves, whose servants they are. Few of them remain after the fall of the leaf. This fact plainly indicates that the proper time for transplanting trees or shrubs is the late Autumn, Winter, or early Spring, when there are but few tender fibrillæ to be injured.



236, Extremity of a rootlet of Maple, with its fibrillæ and spongiole (*a*) magnified 50 diameters.

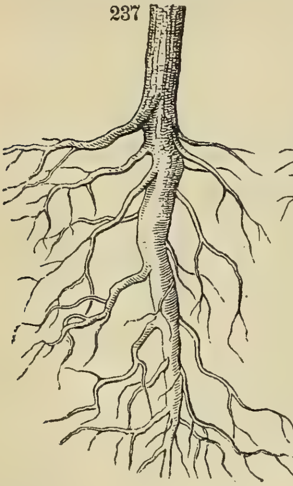
200. Two modes of root-development are definitely distinguished. First, the Axial mode is that where the primary, simple radicle, in growing, extends itself downward in a main body more or less branched, continuous with the stem, and forms the permanent root of the plant. Such is the case with the Maple, Mustard, Beet, and most of the Dicotyledonous Plants (§ 183).

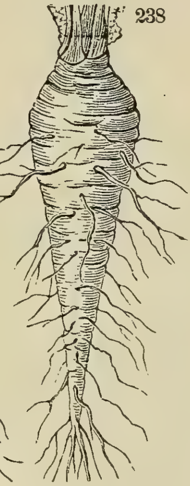
201. Secondly, the Inaxial development is that where the primary radicle proves abortive, never developing into an axial root; but, growing laterally only, it sends out little shoots from its sides, which grow into long, slender roots, nearly equal in value, none of them continuous with the stem. Of this nature are the roots of all the Grasses, the Lilies, and the Monocotyledons generally, and of the Cryptogamia. Plants raised from layers, cuttings, tubers, and slips are necessarily destitute of the axial root.

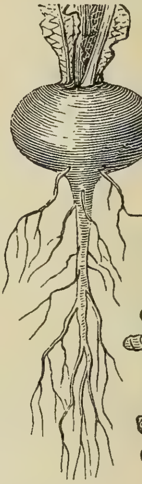
202. **The various forms of the root** are naturally and conveniently referred to these two modes of development. The principal axial forms are the ramous, fusiform, napiform, and con-

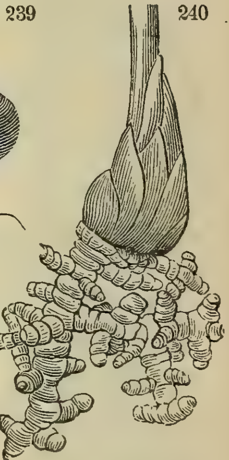
ical. To all these forms the general name *tap-root* is applied. The *ramous* is the woody tap-root of most trees and shrubs, where the main-root branches extensively, and is finally dissolved and lost in multiplied ramifications.

203. **Tuberous tap-roots.** In herbaceous plants the tap-root often becomes thick and fleshy, with comparatively few branches. This tendency is peculiarly marked in biennials (§ 41), where the root serves as a reservoir of the superabundant food which the plant accumulates during its first year's growth, and keeps in store against the exhausting process of fruit-bearing in its second year. Such is the *Fusiform* (spindle-shaped) root—thick, succulent, tapering downward, and also for a short space upward. Beet, Radish, and Ginseng are examples. The *Conical* root tapers all the way from the collum downward (Carrot). The *Napiform* (turnip-shaped) swells out in its upper part so that its breadth equals or exceeds its length, as in Erigenia (235) and Turnip (239).





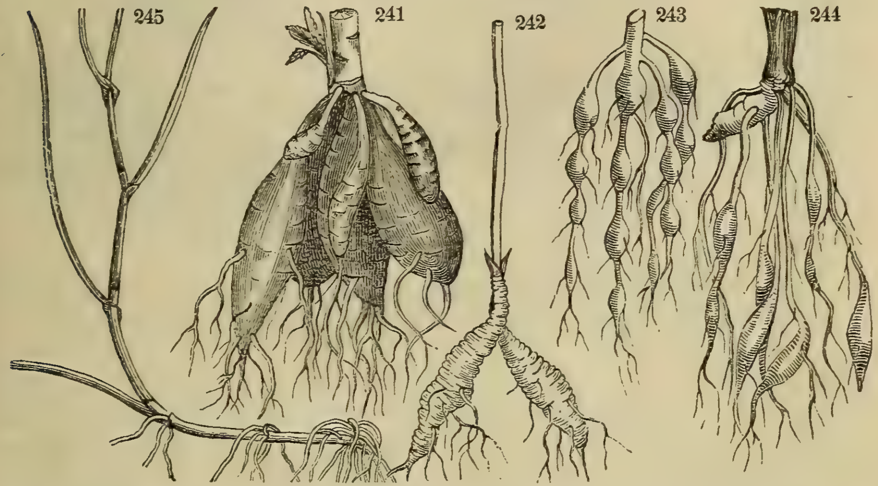




237, Maple—an axial, ramous root. 238, Parsnip—a fusiform root. 239, Turnip—a napiform root. 240, Corallorhiza—a coralline root.

204. **The forms of inaxial roots** are fibrous, fibro-tuberous, tubercular, coralline, nodulous, and moniliform. The *fibrous* root consists of numerous thread-like divisions, sent off directly from the base of the stem, with no main or tap root. Such are the roots of most Grasses, which multiply their fibres excessively in light sandy soils. *Fibro-tuberous* roots (or fasciculate) are

so called when some of the fibres are thick and fleshy, as in the Asphodel, Crowfoot, Pæony, Orchis, and Dahlia. When the fibre is enlarged in certain parts only, it is *nodulous ;* and when the enlargements occur at regular intervals, it is *moniliform* (necklace-like). When it bears little tubers here and there, as in Squirrel-corn (Dicentra Canadensis), it is *tubercular.*



241, Pæony—fibro-tuberous roots. 242, Ginseng—fusiform root. 243, Pelargonium triste—moniliform root. 244, Spirea filipendula—nodulous root. 245, A creeping stem, with adventitious roots.

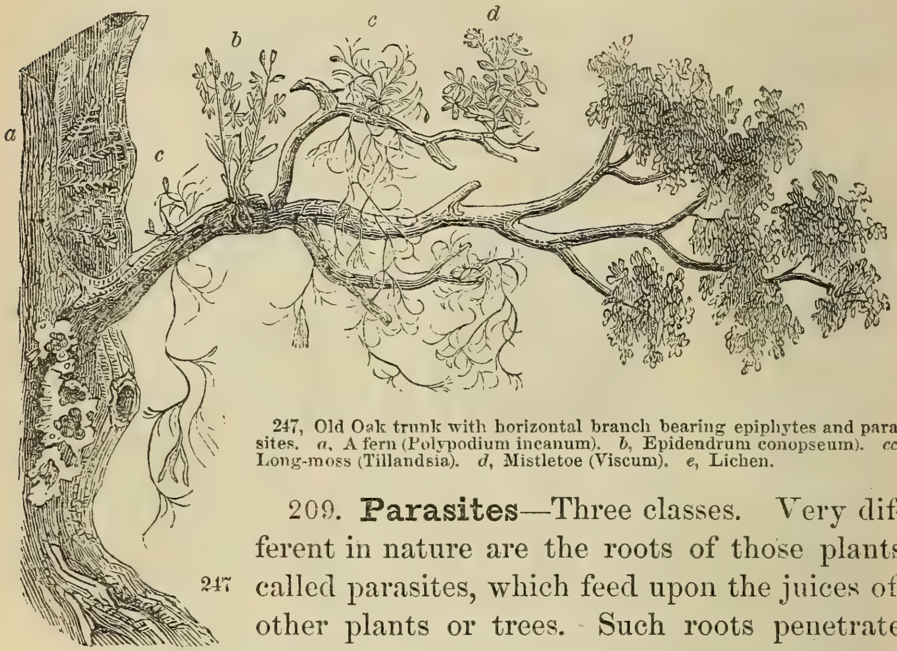
205. Deposits of starch, or farinaceous matter, in all these cases, constitute the thickening substance of the root, stored up for the future use of the plant.

206. **Adventitious roots** are such as originate in some part of the ascending axis—stem or branches—whether above or below the ground. They are so called because their origin is indeterminate, both in place and time. Several special forms should be noticed; as the *cirrhous roots* of certain climbing vines (European Ivy, Poison Ivy, Trumpet-creeper) put forth in great numbers from the stem, serving for its mechanical support and no other known use. Again; the *Fulcra* of certain Monocotyledonous plants originate high up the stem, and descending obliquely enter the ground. The Indian Corn frequently puts forth such roots from its lower joints, and thereby becomes strongly braced. The Screw Pine (Pandanus) of the conservatories puts forth fulcra often several feet in length.

207. **The Banian Tree** (Ficus Indicus) drops "adventitious" roots from its extended branches, which, reaching and entering the ground, grow to supporting columns, like secondary trunks. Thus a single tree becomes at length a grove capable of sheltering an army.

208. **Epiphytes** (επι, upon, φυτον, a plant), a class of plants, called also air-plants, have roots which are merely mechanical,

serving to fix such plants firmly upon other plants or trees, while they derive their nourishment wholly from the air. The Long-moss (Tillandsia) and Conopseum are examples.



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247, Old Oak trunk with horizontal branch bearing epiphytes and parasites. *a*, A fern (Polypodium incanum). *b*, Epidendrum conopseum. *cc*, Long-moss (Tillandsia). *d*, Mistletoe (Viscum). *e*, Lichen.

209. **Parasites**—Three classes. Very different in nature are the roots of those plants called parasites, which feed upon the juices of other plants or trees. Such roots penetrate the bark of the nurse-plant to the cambium layer beneath, and appropriate the stolen juices to their own growth; as the Dodder and Mistletoe. Other parasites, although standing in the soil, are fixed upon foreign roots, and thence derive either their *entire* sustenance, as the Beech-drops and other leafless, colorless plants, or a *part* of their sustenance, as the Cow-wheat (Melampyrum) and Gerardia.

210. **Subterranean stems.** As there are aerial roots, so there are subterranean stems. These are frequently mistaken for roots, but may be known by their habitually and regularly producing buds. Of this nature are the tubers of the Irish Potato, the rootstock of the Sweet-flag, the bulb of the Tulip. But even the true root may sometimes develop buds—accidentally as it were—in consequence of some injury to the upper axis, or some other unnatural condition.

Review.—197. The root defined. Its office. 198. Its leading propensity. Its proper appendages. Purpose of their multiplication. 199. Where is the collum? Where the spongelets? *What* are they? What are the fibrillæ? Their office and history. Why should a tree be planted in *Spring?* 200. Name the two modes of root-development. Define the *axial.* 201. Define the *inaxial.* Give instances. 202. Four varieties of axial or tap roots. Define the ramous. 203. Define the fusiform—The conical—The napiform. What the nature of these fleshy roots? 204. Six varieties of inaxial roots. What of the fibrous?—Fibro-tuberous?—Nodulous?—Moniliform?—Coralline (240)? 205. What is stored in them? 206. What are adventitious roots?—The cirrhous?—The fulcra? 207. Trunks of the Banian. 208. Epiphytes. 209. How do the parasites differ? Mention three classes. 210. Distinguish roots from stems.

CHAPTER XV.

THE STEM, OR ASCENDING AXIS.

211. The general idea of the Axis is this: the central substantial portion of the plant, bearing the appendages, viz., roots below, and the leaf-organs above. The *Ascending Axis* is that which originates with the plumule, tends upward in its growth, and expands itself to the influence of the air and the light.

248. Procumbent stem—Chiogenes hispidula.

212. Although the first direction of the stem's growth is vertical in all plants, there are many in which this direction does not continue, but changes into the oblique or horizontal, either just above the surface of the ground, or just beneath it. If the stem continues to arise in the original direction, as it most commonly does, it is said to be *erect*. If it grow along the ground without rooting, it is said to be *procumbent*, *prostrate*, *trailing*. If it recline upon the ground after having at the base arisen somewhat above it, it is *decumbent*. If it arise obliquely from a prostrate base, it is said to be *ascending;* and if it continue buried beneath the soil, it is *subterranean*. Such stems, although buried like roots, may readily be known by their buds as already explained (§ 210).

249, Decumbent stem—Anagallis arvensis.

213. Stems are either simple or branched. The simple stem is produced by the unfolding of the primary bud (the plumule) in the direction of its point alone. As this bud is developed below into the lengthening stem, it is continually reproduced at its summit, and so is always borne at the termination of the stem. Hence the axis is always terminated by a bud.

214. The Branched Stem, which is by far the most common, is produced by the development of both terminal and axillary buds. The axis produces a bud in the axil of its every leaf; that is, at a point just above the origin of the leaf-stalk. These buds remain inactive in the case of the simple stem, as the Mullein; but more generally are developed into leafy subdivisions of the axis, and the stem thus becomes branched. A *Branch* is, therefore, a division of the axis produced by the development of an axillary bud. This bud, also, ever renewed, is borne at the termination of the branch; so that axillary buds, each in turn, become terminal.

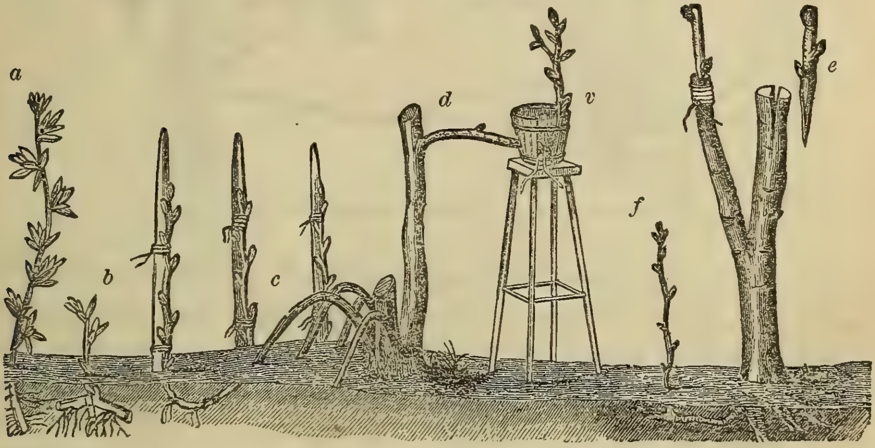
215. The Arrangement of the Branches upon the stem, depends, therefore, upon the arrangement of the leaves; which will be more particularly noticed hereafter. This arrangement is beautifully regular, according to established laws. In this place we briefly notice three general modes. The *Alternate* arrangement is where but one branch arises from each joint (node) on different sides of the stem, as in the Elm. The *Opposite* is where two branches stand on opposite sides of the same node, as in Maple. The *Verticillate* is where three or more branches, equidistant, encircle the stem at each node, as in the Pine.

216. Certain kinds of branches are noted for their tendency to produce adventitious roots, and thus to become independent plants. Nurserymen avail themselves of this property in propagation, and name such branches cions, suckers, stolons, offsets, slips, layers, cuttings, and runners. *The Sucker* is a branch issuing from some underground portion of the plant, leaf-bearing above and sending out roots from its own base, becoming finally a separate, independent plant. The Rose and Raspberry are thus multiplied.

217. *The Stolon* or *Layer* is a branch issuing from some aboveground portion of the stem, and afterward declining to the

ground, takes root at or near its extremity, sends up new shoots, and becomes a new plant. The Hobble-bush and Black-raspberry do this naturally, and gardeners imitate the process in many plants.

218. *The Cion* is any healthy twig or branchlet bearing one or more buds, used by the gardeners in the common process of grafting. Slips and cuttings are fragments of ordinary branches or stems, consisting of young wood bearing one or more buds. These strike root when planted in the ground. So the Grape-vine and Hop. The *Offset* is merely a cion severed from the parent and set in the ground to strike root.

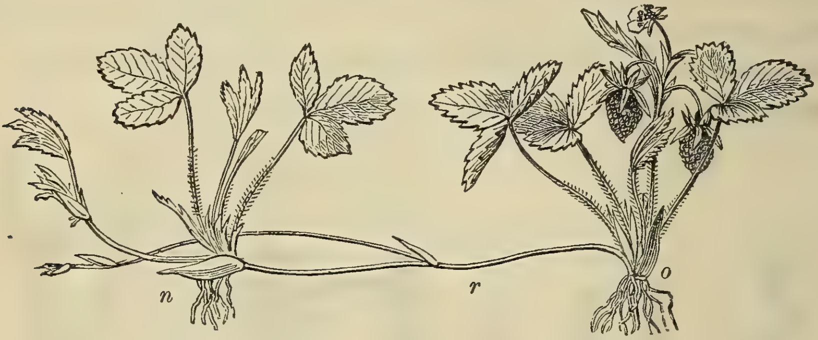


250, *a*, Slip (Gooseberry) taking root. *b*, Cutting (Grape) taking root. *c*, Stolons or layers artificially arranged for propagation. *d*, A mode of dwarfing; the vessel, *v*, is filled with soil. *e*, Scions; process of grafting. *f*, A sucker.

219. *The Runner* is a prostrate, filiform branch, issuing from certain short-stemmed herbs, extending itself along the surface of the ground, striking root at its end without being buried. Thence leaves arise, and a new plant, which in turn sends out new runners, as in the Strawberry.

220. *The Node*, or joint of the stem, marks a definite point of a peculiar organization, where the leaf with its axillary bud arises. The nodes occur at regular intervals, and the spaces between them are termed INTERNODES. This provides for the symmetrical arrangement of the leaves and branches of the stem. In the root no such provision is made, and the branches have no manner of arrangement. Now the *growth of the stem* consists

in the development of the internodes. In the bud, the nodes are closely crowded together, with no perceptible internodes; thus bringing the rudimentary leaves in close contact with each other. But in the stem, which is afterward evolved from that bud, we see full-grown leaves separated by considerable spaces. That is, while leaves are developed from the rudiments, internodes are pushed out from the growing point.



251, A Strawberry plant (Fragaria vesca) sending out a runner.

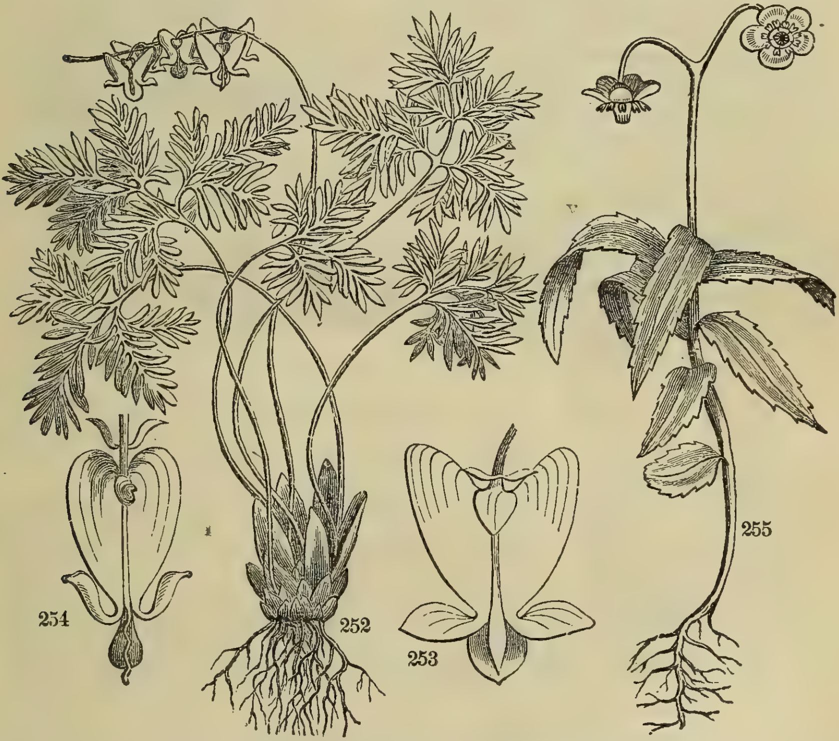
221. There are, however, many species of plants, especially of herbs, in which the axis of the primary bud does not develop into internodes at all, or but partially in various degrees. See the axis of Trillium, Onion, and Bloodroot. Such stems seldom appear above-ground. They are *subterranean.* This fact makes a wide difference in the forms of stems, and naturally constitutes them into two great divisions—viz., *the Leaf-stems and the Scale-stems.*

Review.—211. What is the Axis? What the Ascending Axis? 212. Is the axis always erect? What is a procumbent stem? What decumbent?—Ascending?—Subterranean? How may these be distinguished from roots? 213. Explain the growth of a simple stem. Where may the plumule-bud always be found? 214. Explain the growth of a branching stem. Define a branch. 215. Their order. State the three general modes. 216. What is a sucker? 217. What is a stolon? 218. What is a cion?—An offset?—Slips and cuttings? 219. How does the Strawberry spread? 220. What is a Node?—An Internode? What of Stem-growth? 221. State carefully a different method. Two grand divisions of Stems.

CHAPTER XVI.

FORMS OF THE LEAF-STEMS.

222. **The leaf-stems** are those forms which, with internodes fully developed, rise into the air crowned with leaves. The principal forms are the caulis, culm, trunk, caudex, and vine. They are either herbaceous or woody. They bear fruit but one season and then perish, at least down to the root, scarcely becoming woody; as seen in Mustard, Radish, and Grasses. But the woody leaf-stems survive the Winter, and become firm and solid in substance in after years; as do all the forest trees.

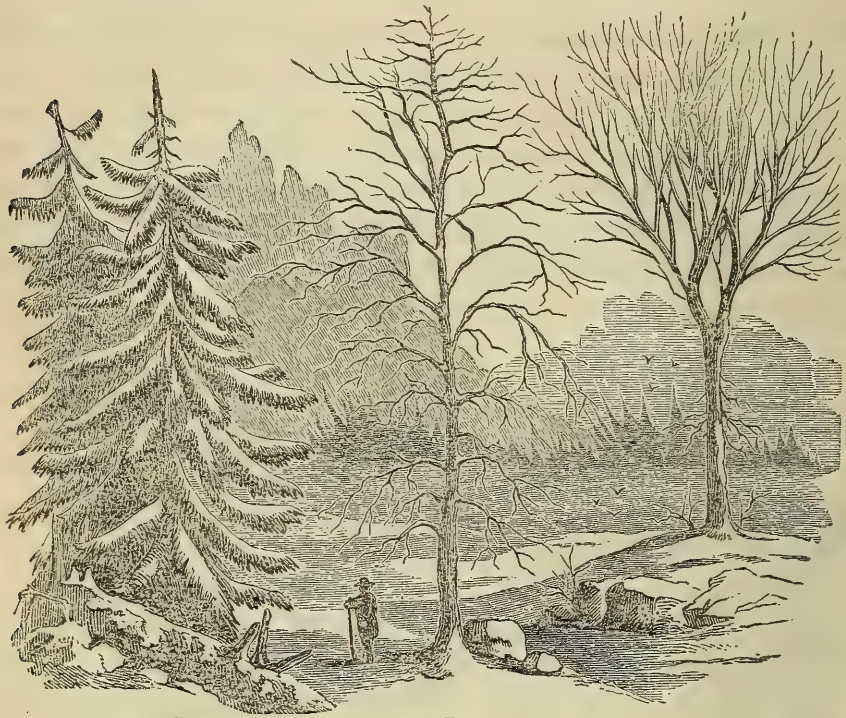


252, Scale-stem (Dicentra cucullaria). 253, A flower of the same. 254, A flower of D. Canadensis. 255, Leaf-stem (Chimaphila maculata).

223. Caulis is a term generally applied to the annual leaf-stems of herbaceous plants. "Halm" is a term used in England with the same signification. *Caulescent* and *acaulescent* are con-

venient terms, denoting, the former the presence, and the latter the absence of the caulis or aerial stem.

224. THE CULM is the stem of the Grasses and the Sedges, generally jointed, often hollow, rarely becoming woody; as in Cane and Bamboo.



256, S, Spruce. B, Beech. E, Elm; to illustrate excurrent and solvent axis.

225. THE TRUNK is the name of the peculiar stems of arborescent plants. It is the central column or axis which supports their branching tops and withstands the assaults of the wind by means of the great firmness and strength of the woody or ligneous tissue with which it abounds. The trunk is usually seen simple and columnar below, for a certain space, then variously dividing itself into branches. Here it is cylindrical, straight, and erect, as in the Forest Pine; prismatic often, as in the Gum-tree; gnarled and curved, as in the Oak; or inclined far over its base, as in the Sycamore.

226. In dividing itself into branches we observe two general modes, with their numerous variations, strikingly characterizing

the tree forms. In the one, named by Lindley the EXCURRENT, the trunk, from the superior vigor of its terminal bud, takes precedence of the branches, and runs through to the summit, as in the Beech, Birch, Oak, and especially in the Spruce—trees with oval or pyramidal forms. But in the other, the SOLVENT AXIS, as seen in the Elm and Apple-tree, the trunk suddenly divides into several subequal branches, which thence depart with different degrees of divergency, giving the urn form to the Elm, the rounded form to the Apple-tree, the depressed form to the Sloe-tree (Viburnum) and Dogwood.

227. CAUDEX is a term now applied to the peculiar trunk of the Palms and Tree-ferns, simple, branchless columns, or rarely dividing in advanced age. It is produced by the growth of the terminal bud alone, and its sides are marked by the scars of the fallen leaf stalks of former years, or are yet covered by their persistent bases. The *stock* or *caudex* of the cactus tribe is extraordinary in form and substance. It is often jointed, prismatic, branched, always greenish, fleshy, and full of a watery juice. Instead of leaves, its lateral buds develop spines only, the stem itself performing the functions of leaves. These plants abound in the warm regions of tropical America, and afford a cooling, acid beverage to the thirsty traveller when springs dry up under the torrid sun.

228. THE VINE is either herbaceous or woody. It is a stem too slender and weak to stand erect, but trails along the ground, or any convenient support. Sometimes, by means of special organs for this purpose, called *tendrils*, it ascends trees and other objects to a great height; as the Grape, Gourd, and other climbing vines.

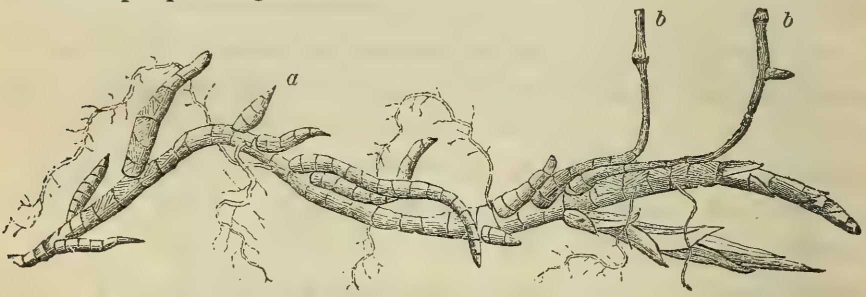
229. The *twining vine* having also a length greatly disproportioned to its diameter, supports itself on other plants or objects by entwining itself around them, being destitute of tendrils. Thus the Hop ascends into the air by foreign aid, and it is a curious fact that the direction of its winding is always the same, viz., *with the sun*, from left to right; nor can any artificial training induce it to reverse its course. This is a general law among twining stems. Every individual plant of the same species revolves in the same direction, although opposite directions may characterize different species. Thus the Morning-Glory revolves always *against the sun*.

Review.—222. Carefully repeat the definition. When are they herbaceous? When woody? 223. Define Caulis, and two derived terms. 224. What is a Culm? 225. What is the Trunk? Various forms of it. 226. Its characteristic difference in Beech and Elm. 227. Characterize the trunk of the Palm-tree—Of Cactus. 228. Describe the Vine, and two varieties. Are the climbers or twiners armed with tendrils? 229. The law of the course of the twiners. Course of Hop—Of Morning-Glory.

CHAPTER XVII.

FORMS OF SCALE-STEMS.

230. **The Scale-stems** are those forms which, with internodes partially or not at all developed, and generally clothed with scales for leaves, scarcely emerge from beneath the soil. They are the *creeper* and *rhizoma* (developed), the *crown*, *tuber*, *corm*, and *bulb* (undeveloped). Their forms are singular, often distorted in consequence of their underground growth and the unequal development of the internodes. They commonly belong to perennial herbs, and the principal forms are described as follows; but intermediate connecting forms are very numerous, and often perplexing.



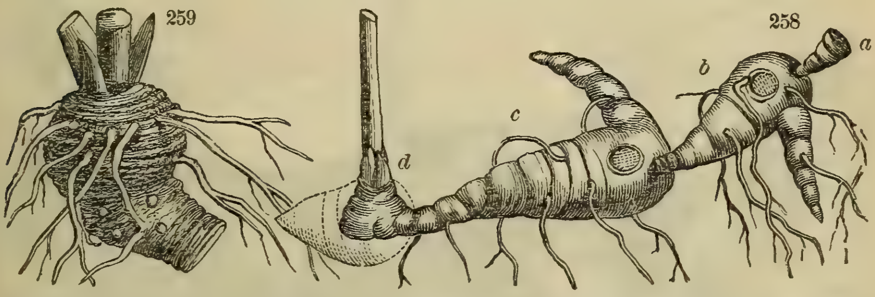
257, Creeper of "Nimble Will," or Witch-grass; *a*, Bud; *bb*, bases of culms.

231. THE CREEPER is either subaerial or subterranean. In the former case it is prostrate, running and rooting at every joint, and hardly distinguishable otherwise from leaf-stems; as the Twin-flower (Linnæa), the Partridge-berry (Mitchella). In the latter case it is more commonly clothed with scales, often branching extensively, rooting at the nodes, exceedingly tenacious of life, extending horizontally in all directions beneath the soil, annually sending up from its terminal buds erect stems into the air. The Witch-grass (Triticum repens) is an example. Such plants are a sore evil to the garden. They can have no better cultivation than to be torn and cut to pieces by the spade of the angry gardener, since they are thus multiplied as many times as there are fragments.

232. Repent stems of this kind are not, however, without their use. They frequently abound in loose, sandy soil, which they serve to bind and secure against the inroads of the water and even the sea itself. Holland is said to owe its very existence to the repent stems of such plants as the Mat-grass (Arundo arenaria), Carex arenarius, and Elymus arenarius, which overrun the artificial dykes upon its shores, and by their innumerable roots and creepers apparently bind the loose sand into a firm barrier against the washing of the waves. So the *turf*, chiefly composed of repent Grass-stems, forms the only security of our own sandy or clayey hills against the washing rains.

233. THE RHIZOME OR ROOT-STOCK differs from the creeper only in being shorter and thicker, having its internodes but partially developed. It is a prostrate, fleshy, rooting stem, either wholly or partially subterranean, often scaly with the bases of undeveloped leaves, or marked with the scars of former leaves, and yearly producing new shoots and roots. Such is the fleshy, horizontal portion of the Blood-root, Sweet-flag, Water-lily, and Bramble (the latter hardly different from the creeper).

234. *The growth of the rhizome* is instructive, marking its peculiar character. Each joint marks the growth of a year. In Spring, the terminal bud unfolds into leaves and flowers, to perish in Autumn—a new bud to open the following Spring, and a new internode, with its roots, to abide several years. The number of joints indicates, not the age of the plant, but the destined age of each internode. Thus if there are three joints, we infer that they are triennial, perishing after the third season, while the plant still grows on.



258. Rhizoma of Solomon's Seal (Polygonatum multiflorum). *a*, Fragment of the first year's growth; *b*, the second year's growth; *c*, growth of the third year; *d*, growth of the present (fourth) year, bearing the stem, which, on decaying, will leave a scar (seal) like the rest. 259, Premorse root of Trillium erectum.

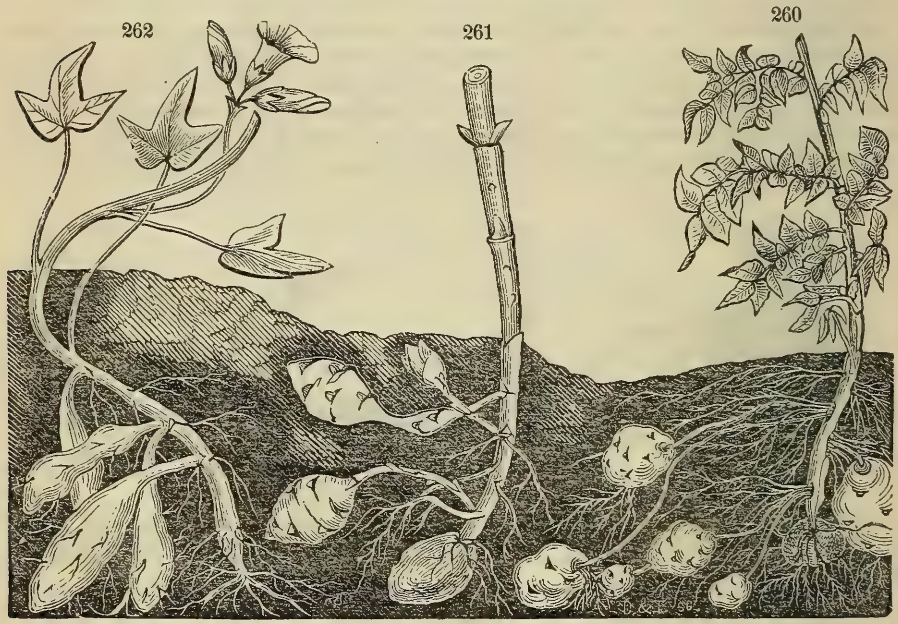
235. THE PREMORSE ROOT-STOCK, formerly described as a root, is a short, erect rhizome, ending abruptly below, as if bitten square off (præmorsus). This is owing to the death of the earlier and lower internodes in succession, as in the horizontal rhizome. Scabius, Viola pedata, and Benjamin-root (Trillium) are examples.

236. CROWN OF THE ROOT designates a short stem with condensed internodes, remaining upon some perennial roots, at or

beneath the surface-soil, after the leaves and annual stems have perished.

237. THE TUBER is an annual thickened portion of a subterranean stem or branch, provided with latent buds called eyes, from which new plants ensue the succeeding year. It is the fact of its origin with the ascending axis, and the production of buds, that places the tuber among stems instead of roots. The Potato and Artichoke are examples.

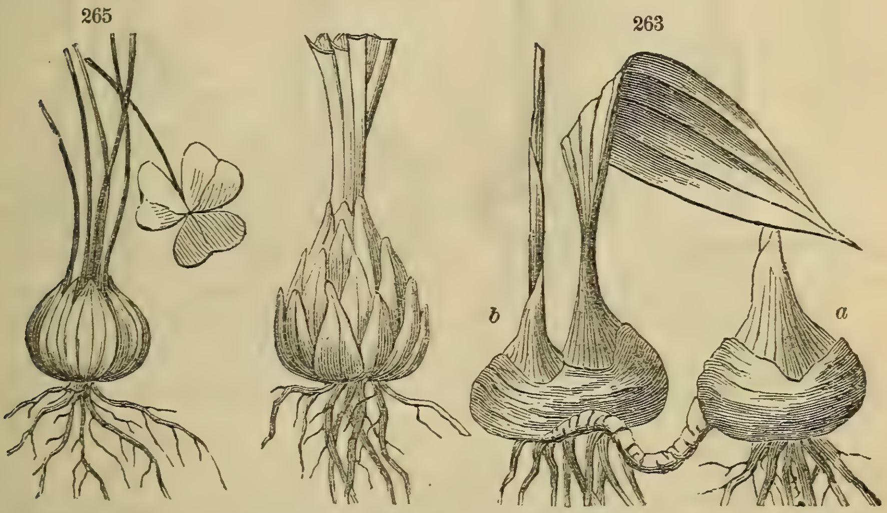
238. The stem of the Potato-plant sends out roots from its base, and branches above, like other plants; but we observe that its branches have two distinct modes of development. Those branches which rise into the air, whether issuing from the aboveground or the underground portion of the stem, expand regularly into leaves, etc.; while those lower branches which continue to grope in the dark, damp ground, cease at length to elongate, swell up at the ends into tubers with developed buds and abundance of nutritious matter in reserve for renewed growth the following year.



Tubers as they grow.—260, The common Potato (Solanum). 261, Artichoke (Helianthus). 262. Sweet Potato (Convolvulus).

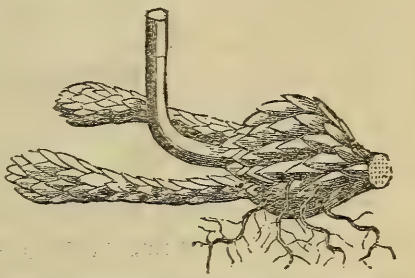
239. THE CORM is an underground, solid, fleshy stem, with condensed internodes, never extending, but remaining of a rounded form covered with thin scales. It is distinguished from roots by its leaf-bud, which is either borne at the summit, as in the Crocus, or at the side, as in the Colchicum and Putty-root (Aplectrum).

240. The Bulb partakes largely of the nature of the bud. It consists of a short, dilated axis, bearing an oval mass of thick, fleshy scales, closely packed above, a circle of adventitious roots around its base, and a flowering stem from the terminal, or a lateral bud.



263, Corms of Putty-root (Aplectrum); *a*, of last year—*b*, of the present year. 264, Scale-bulb of White Lily. 265, Scale-bulb of Oxalis violacea.

241. *How multiplied.*—Bulbs are renewed or multiplied annually at the approach of Winter by the development of bulbs from the axils of the scales, which increase at the expense of the old, and ultimately become detached. Bulbs which flower from the terminal bud are necessarily either annual or biennial; those flowering from an axillary bud may be perennial, as the terminal bud may in this case continue to develop new scales indefinitely.

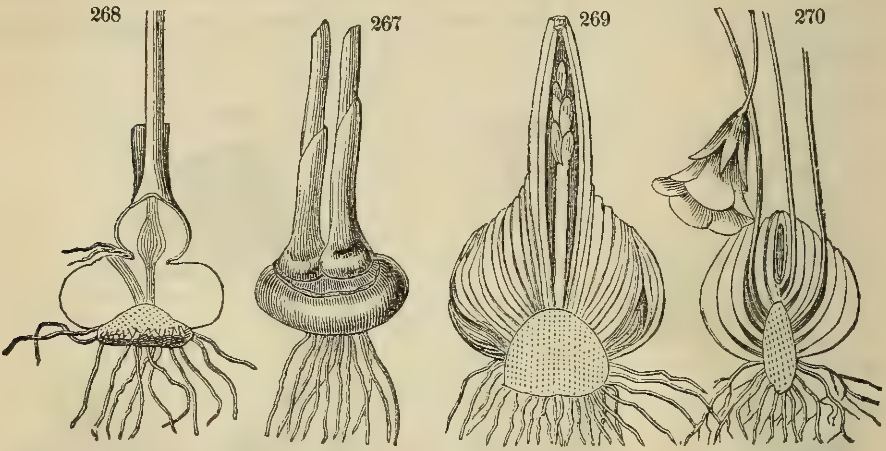


266, Bulb of Lilium superbum, with habit of a rhizome; *a*, full grown bulb sending up a terminal stem *c*, and two offsets *bb*, for the bulbs of next year.

242. Bulbs are said to be *tunicated* when they consist of concentric layers, each entire and enclosing all within it, as in the Onion. But the more common variety is the *scaly* bulb—consisting of fleshy, concave scales, arranged spirally upon the axis, as in the Lily.

243. The tuber, corm, and bulb are analogous forms approaching by degrees to the character of the bud, which consists of a little axis bearing a covering of scales. In the tuber, the axis is excessively developed, while the scales are reduced to mere linear

points. In the corm, the analogy is far more evident, for the axis is less excessive and the scales more manifest; and lastly, in the bulb the analogy is complete, or overdone, the scales often becoming excessive.



267. Corm of Crocus, with new ones forming above. 268, Vertical section of the same. 269, Section of bulb of Hyacinth, with terminal scape and axillary bulblet. 270, Section of bulb of Oxalis violacea, with axillary scapes.

Review.—230. Give carefully the definition. Which forms are undeveloped? Which partly developed? 231. Define the Creeper. Its two classes. How is Witch grass best cultivated? Usefulness of such stems. What is *sward?* 233. Define Root-stock? Show its manner of growth by the figure (258). 235. What is the premorse Root-stock? 236. The stem of Clover, Asparagus, etc., in Winter is what? 237. What is a Tuber? Show by fig. 260 how it grows. 239. Define Corm. Show by fig. 263 how it grows. 240. Describe the bulb. Show its growth by fig. 266. Varieties. 243. Point out the gradation in tuber, corm, and bulb.

CHAPTER XVIII.

THE LEAF-BUD.

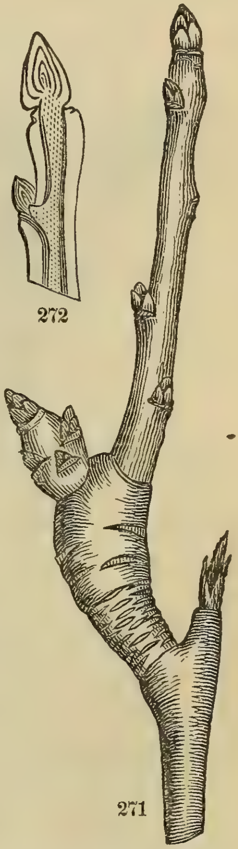
244. It is but a step from the study of the bulb to that of the leaf-bud. Buds are of two kinds in respect to their contents—the *leaf-bud* containing the rudiments of a leafy stem or branch, the *flower-bud* containing the same elements transformed into the nascent organs of a flower for the purpose of reproduction.

245. **The leaf-bud** consists of a brief, cone-shaped axis with a tender growing point, bearing a protecting covering of imbricated scales and incipient leaves.

246. The leafy nature of the scales is evident from a careful inspection of such buds as those of the Rose, Currant, Tulip-tree,

when they are swollen or bursting in Spring. The student will notice a gradual change from the outer scales to the evident leaves or stipules within, as seen in Fig. 273. As a further protection against frost and rain, we find the scales sometimes clothed with hairs, sometimes varnished with resin. This is abundant and very aromatic in the buds of the Balm-of-Gilead and other Poplars.

247. In regard to position, buds are either terminal or axillary, a distinction already noticed. *Axillary buds* are especially noted as being either *active* or *latent.* In the former case they are unfolded into branches at once, or in the Spring following their formation. But latent buds suspend their activities from year to year, or perhaps are never quickened into growth. Axillary buds become terminal so soon as their development fairly commences; therefore each branch also has a terminal bud, and, like the main axis, is capable of extending its growth as long as that bud remains unharmed. If it be destroyed by violence or frost, or should it be transformed into a flower-bud, the growth in that direction forever ceases.

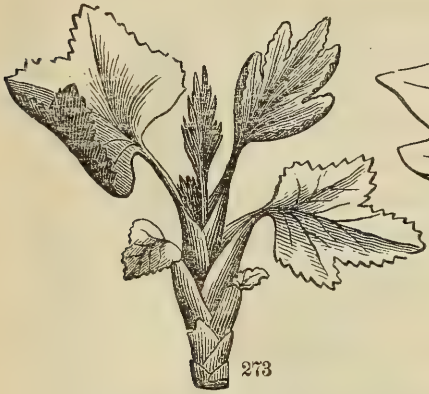


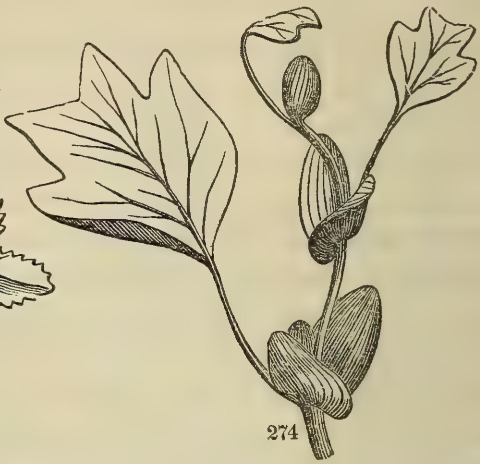
271, Branch of Pear-tree. The terminal bud *a*, having been destroyed, an axillary bud supplied its place, and formed the axis *b*. *c*, Thickened branch with flower-buds; *d*, branch with leaf-buds. 272, *t*, section of terminal bud; *l*, of axillary bud.

248. **The suppression of axillary buds** tends to simplify the form of the plant. Their total suppression during the first year's growth of the terminal bud is common, as in the annual stem of Mullein and in most perennial stems. When axillary buds remain permanently latent, and only the terminal bud unfolds year after year, a simple, branchless trunk, crowned with a solitary tuft of leaves, is the result, as in the Palmetto of our southern borders.

249. A partial suppression of buds occurs in almost all species, and generally in some definite order. In plants with opposite leaves, sometimes one bud of the pair at each node is developed and the other is suppressed, as in the Pink tribe. When both buds are developed, the branches, appearing in pairs like arms, are said to be brachiate, as in the Labiates. In many trees the terminal buds are arrested by inflorescence each season,

and the growth is continued by axillary buds alone, as in the Catalpa and Horse-chestnut. In all trees, indeed, buds are suppressed more or less, from various causes, disguising at length the intended symmetry of the branches, to the utter confusion of twigs and spray.

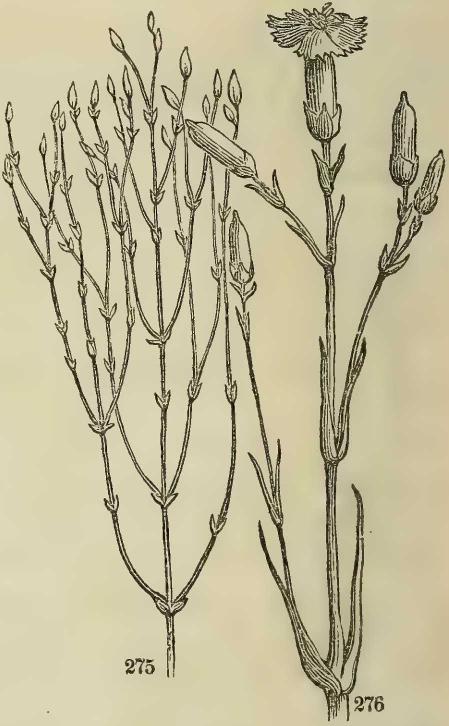




273, Bud of Currant unfolding,—the scales gradually becoming leaves. 274, Bud of Tulip-tree,—the scales unfolding into stipules.

250. *Accessory buds*, one or more, are sometimes found just above the true axillary bud, or clustered with it, and only distinguished from it by their smaller size; as in the Cherry and Honeysuckle.

251. *Adventitious* or accidental buds are such as are neither terminal nor axillary. They occasionally appear on any part of the plant in the internodes of the stem or branches, on the root or even the leaves. Such buds generally result from some abnormal condition of the plant, from pruning or other destruction of branches or stem above, while the roots remain in full vigor; thus destroying the equilibrium of vital force between the upper and lower axis. The leaf of the

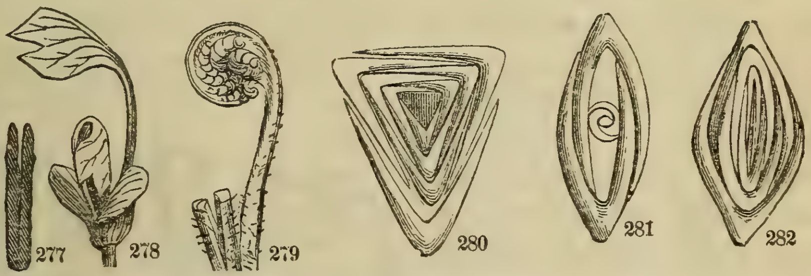


275, Hypericum Sarothra, with brachiate branches. 276, Pink (Dianthus)—axillary buds alternately suppressed.

Walking-fern emits rootlets and buds at its apex; the leaf of Bryophyllum from its margin each—bud here also preceded by a rootlet. Some plants are thus artificially propagated in conservatories from the influence of heat and moisture on a leaf or the fragment of a leaf.

252. **Vernation** or **præfoliation** are terms denoting the mode of arrangement and folding of the leaf organs composing the bud. This arrangement is definitely varied in different orders of plants, furnishing useful distinctions in systematic botany. It may be studied to excellent advantage by making with a keen instrument a cross-section of the bud in its swollen state, just before expansion; or it may be well observed by removing one by one the scales. The Forms of Vernation are entirely analogous to those of Æstivation, and denoted by similar terms.

253. Vernation is considered in two different aspects—first, the manner in which the leaf itself is folded; second, the arrangement of the leaves in respect to each other. This depends much upon the phyllotaxy. (§ 261.)



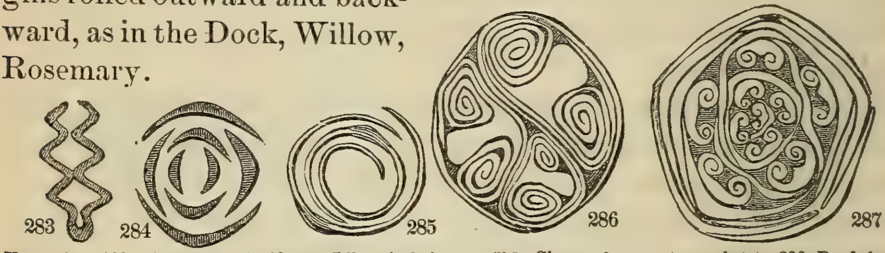
Vernation, 277, of Oak leaf; 278, of Liriodendron (Tuliptree), 279, of Fern; 280, of Carex; 281, Sage; 282, Iris.

254. Each leaf alone considered is either *flat* and *open*, as in the mistletoe, or it is *folded* or *rolled*, as follows: viz. *Reclined*, when folded crosswise, with apex bent over forward toward the base, as in the Tulip-tree; *Conduplicate*, when folded perpendicularly, with the lateral halves brought together face to face, as in the Oak; *Plaited*, or Plicate, each leaf folded like a fan, as in Birch.

255. *Circinate* implies that each leaf is rolled or coiled downward from the apex, as in Sundew and the Ferns.

256. The *Convolute* leaf is wholly rolled up from one of its

sides, as in the Cherry; while the Involute has both its edges rolled inward, as in Apple, Violet; and *Revolute* has both margins rolled outward and backward, as in the Dock, Willow, Rosemary.

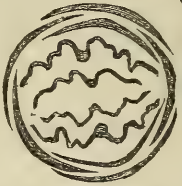


Vernation, 283, of Birch leaf; 284, of Lilac (imbricate); 285, Cherry leaves (convolute); 286, Dock bud (revolute); 287, Balm of Gilead (involute).

257. The general vernation is loosely distinguished in descriptive botany as *valvate* (edges meeting), and *imbricate* (edges overlapping), terms to be noticed hereafter. The valvate more often occurs in plants with opposite leaves.

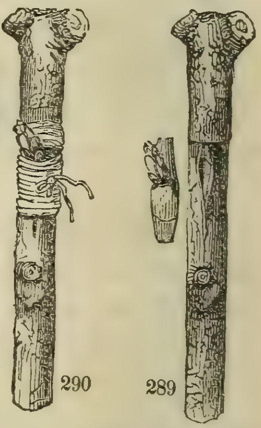
258. **Imbricate** vernation is *Equitant* (riding astraddle), when conduplicate leaves alternately embrace—the outer one the next inner by its unfolded margins, as in the Privet and Iris (282). It is *Obvolute* when it is half-equitant; that is, the outer leaf embraces only one of the margins of the inner, as in the Sage (281). Again, it is *Triquitrous* where the bud is triangular in section and the leaves equitant at each angle, as in the Sedges (280).

259. *The principle of budding.*—Each leaf-bud may be regarded as a distinct individual, capable of vegetating either in its native position, or when removed to another, as is extensively practised in the important operation of *budding*.



288, Vernation of Sycamore bud.

260. **Bulblets.** In the Tiger-lily, Cicuta bulbifera, and Aspidium bulbiferum, the axillary buds spontaneously detach themselves, fall to the ground, and become new plants. These remarkable little bodies are called *bulblets*.



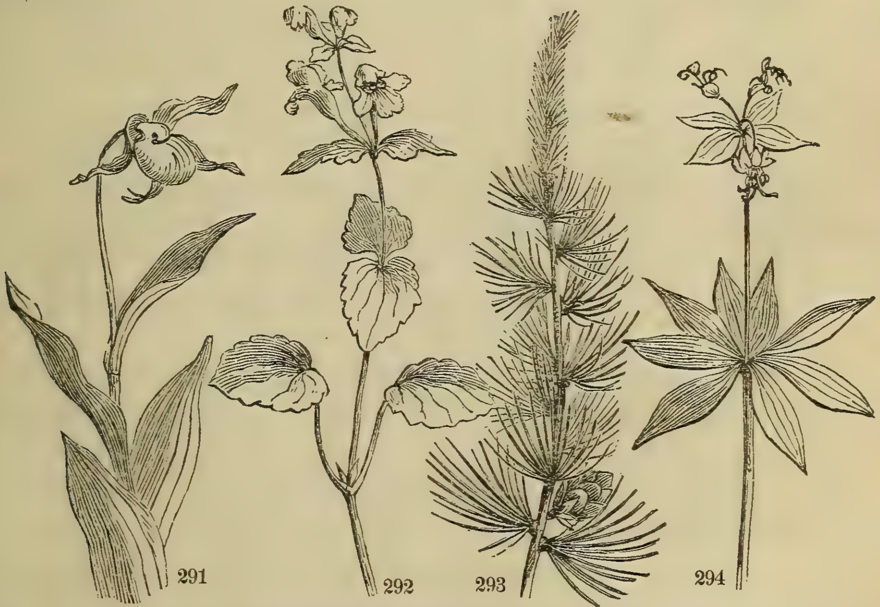
289, 290, Showing the process of "budding."

Review.—244. Two kinds of buds. 245. Define the leaf-bud. Show the leafy nature of the scales by fig. 273. The coating of buds. 247. Buds classed as to position. Location of the axillary buds. Two kinds. When do the axillary become terminal? 248. What if a part of them be suppressed? What if all? 249. What is a brachiate axis? How in the Pink? How in Catalpa? 250. What are accessory buds? Adventitious? Examples. 252. What is Vernation? How may we study it? Considering each leaf alone, when is it reclined?—Conduplicate?—Plaited? When circinate?—Convolute?—Involute?—Revolute? How is the vernation in Oak?—Dock?—Birch?—Fern? etc. 258. Considering leaves combined, when are they obvolute?—Equitant?—Triquitrous? 259. State the principle of Budding. What are Bulblets?

CHAPTER XIX.

PHYLLOTAXY, OR LEAF-ARRANGEMENT.

261. As the position of the leaf upon the stem marks the position of the axillary bud, it follows that the order of the leaf-arrangement will be the order of the branches also. The careful investigation of this subject has developed a science of unexpected exactness and beauty, called phyllotaxy (φύλλον, a leaf, τάξις, order.)



291, Ladies'-slipper (leaves alternate); 292, Synandra grandiflora (leaves opposite); 294, Medeola Virginica (leaves verticillate); 293, Larix Americana (leaves fasciculate).

262. In regard to position, leaves are *radical* when they grow out of the stem at or beneath the surface of the ground, so as to appear to grow from the roots; *cauline*, when they grow from the stem; and *ramial* (*ramus*, a branch), when from the branches.

Their arrangement on the axis is according to the following general modes:

Alternate, one above another on opposite sides, as in the Elm.

Scattered, irregularly spiral, as in the Potato vine.

Rosulate, clustered regularly, like the petals of a Rose, as in the Plantain and Shepherd's-purse.

Fasciculate, tufted, clustered many together in the axil, as seen in the Pine, Larch, Berberry.

Opposite, two, against each other, at the same node. Ex., Maple.

Verticillate, or whorled, more than two in a circle at each node, as in the Meadow-lily, Trumpet-weed. We may reduce all these modes to TWO GENERAL TYPES,—the *alternate*, including all cases with one leaf at each node; the *opposite*, including cases with two or more leaves at each node.

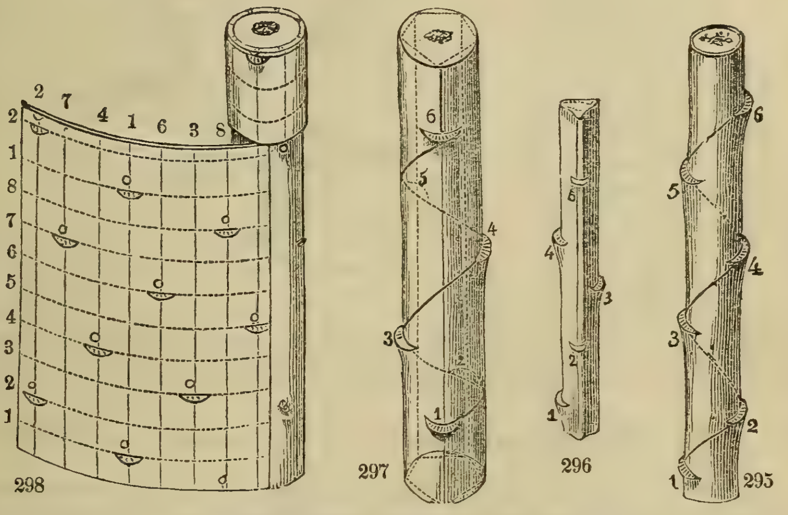
263. The true character of the alternate type may be learned by an experiment. Take a straight leafy shoot or stem of the Elm or Flax, or any other plant with seemingly scattered leaves, and beginning with the lowest leaf, pass a thread to the next above, thence to the next in the same direction, and so on by all the leaves to the top; the thread will form a regular *spiral.* The opposite leaved type is also spiral, consisting of two or more parallel spirals—as many as there are leaves at the node. Therefore it is an established law that *the course of development in the growing plant is universally spiral.* But this, the FORMATIVE CYCLE as it is called, has several varieties.

264. **The Elm cycle.** In the strictly alternate arrangement (Elm, Linden, Grasses) the spiral thread makes one complete circuit and commences a new one at the third leaf. The third leaf stands over the first, the fourth over the second, and so on, forming two vertical rows of leaves. Here (calling each complete circuit a *cycle*) we observe, first, that this cycle is composed of two leaves; second, that the angular distance between its leaves is $\frac{1}{2}$ a circle (180°); third, if we express this cycle mathematically by $\frac{1}{2}$, the numerator (1) will denote the turns or revolutions, the denominator (2) its leaves, and the fraction itself the angular distance between the leaves ($\frac{1}{2}$ of 360°).

265. **The Alder cycle.** In the Alder, Birch, Sedges, etc.,

the cycle is not complete until the fourth leaf is reached. The fourth leaf stands over the first, the fifth over the second, etc., forming three vertical rows. Here call the cycle $\frac{1}{3}$; 1 denotes the turns, 3 the leaves, and the fraction itself the angular distance ($\frac{1}{3}$ of 360°).

266. **The Cherry cycle.** In the Cherry, Apple, Peach, Oak, Willow, etc., neither the third nor the fourth leaf, but the *sixth*, stands over the first; and in order to reach it the thread makes two turns around the stem. The sixth leaf is over the first, the seventh over the second, etc., forming five vertical rows. Call this the $\frac{2}{5}$ cycle; 2 denotes the turns, 5 the leaves in the cycle, and the fraction itself the angular distance ($\frac{2}{5}$ of 360°).



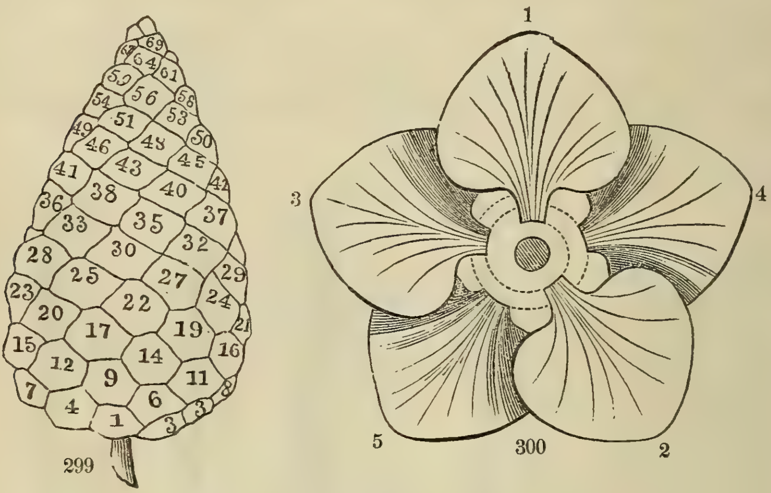
295, 296, 297, Showing the course of the spiral thread and the order of the leaf-succession in the axes of Elm, Alder, and Cherry. 298, Axis of Osage-orange with a section of the bark peeled, displaying the order of the leaf-scars (cycle $\frac{3}{8}$).

267. **The Osage-orange cycle.** In the common hedge plant, Osage-orange, the Holly, Evening Primrose, Flax, etc., we find no leaf exactly over the first until we come to the 9th, and in reaching it the spiral makes three turns. Here the leaves form eight vertical rows. It is a $\frac{3}{8}$ cycle; 3 the number of turns, 8 the number of leaves, and the fraction the angular distance between the leaves ($\frac{3}{8}$ of 360°).

268. These several fractions which represent the above cycles form a series as follows: $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{5}$, $\frac{3}{8}$, in which each term is the

sum of the two preceding. The fifth terms in order will, therefore, be $\frac{5}{13}$; and this arrangement is actually realized in—

269. **The White Pine cycle.** In the young shoots of the White Pine, in cones of most Pines, in Flea-bane (Erigeron Canadense), etc., the fourteenth leaf stands over the first, the fifteenth over the second, etc. The spiral thread makes five revolutions to complete the cycle, which is, therefore, truly expressed by $\frac{5}{13}$.



299

300

299, Phyllotaxy of the cone (cycle $^8/_{21}$) of Pinus serotina. The scales are numbered (1, 2, 3, etc.) in order as they occur in the formative cycle. Between 1 and 22 are 8 turns and 21 scales, etc. 300. Cherry cycle ($^2/_5$) as viewed from above, forming necessarily that kind of æstivation called quincuncial.

270. **The Houseleek cycle** is next in order, expressed by the fraction $\left(\frac{3+5}{8+13}\right)$ $\frac{8}{21}$, having eight turns and twenty-one leaves. Examples are found in the Scotch Pine, Houseleek, and the cone of Pine figured above (§ 299).

Review.—261. What is the etymology of the word phyllotaxy? 262. Explain "Lvs. radical"—Lvs. cauline—Lvs. ramial. What is the alternate arrangement?—Opposite?—Scattered?—Fasciculate?—Verticillate? Reduce to *two* general types. 263. What experiment reveals the true nature of these types? State the Law of plant-development. 264. Carefully explain the Elm Cycle. Why is its index $\frac{1}{2}$? 265. Explain also the Alder Cycle and its index—and the other cycles. 268. Show the relation of these cycles. Explain figs. 299, 300.

CHAPTER XX.

MORPHOLOGY OF THE LEAF.

271. The leaf constitutes the verdure of plants, and is by far the most conspicuous and beautiful object in the scenery of nature. It is also of the highest importance in the vegetable economy, being the organ of *digestion* and *respiration.* It is characterized by a thin and expanded form, presenting the largest possible surface to the action of the air and light, which agents are indispensable to the life and increase of the plant.

The leaf may be regarded as an expansion of the substance of the bark, extended into a broad thin plate by means of a woody framework or skeleton, issuing from the inner part of the stem. The expanded portion is called the lamina or blade of the leaf, and it is either *sessile*, that is, attached to the stem by its base, or it is *petiolate*, attached to the stem by a footstalk called the petiole.

272. The regular petiole very often bears at its base a pair of leaf-like appendages, more or less apparent, called *stipules.* Leaves so appendaged are said to be *stipulate ;* otherwise they are *exstipulate.*

273. Therefore a complete leaf consists of three distinct parts—the lamina or blade, the petiole, and the stipules. But they are subject to endless transformations. Either of them may exist without the others, or they may all be transformed into other organs, as pitchers, spines, tendrils, and even into the organs of the flower, as will hereafter appear.

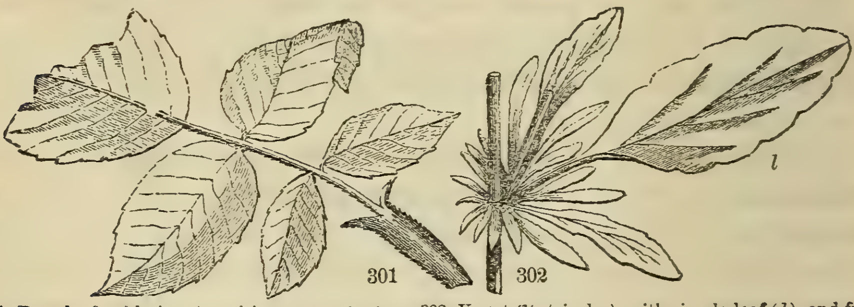
274. **The Petiole** in form is rarely cylindrical, but more generally flattened or *channelled* on the upper side. When it is flattened in a vertical direction, it is said to be *compressed*, as in the Aspen or Poplar. In this case the blade is very unstable, and agitated by the least breath of wind. The *winged petiole* is flattened or expanded into a margin, but laterally instead of vertically, as in the Asters. Sometimes the margins outrun the petioles, and extend down the stem, making that winged, or

alate, also. Such leaves are said to be *decurrent* (*decurro*, run down). Ex., Mullein.

275. *The amplexicaul* petiole is dilated at the base into a margin which surrounds or clasps the stem, as in the Umbellifers. Frequently we find the stem-clasping margins largely developed, constituting a *sheath*—with free edges in the Grasses, or closed into a tube in the Sedges.

276. The petiole is simple in the simple leaf, but compound or branched in the compound leaf, with as many branches (*petiolules*) as there are divisions of the lamina. A leaf is *simple* when its blade consists of a single piece, however cut, cleft, or divided; and *compound* when it consists of several distinct blades, supported by as many branches of a compound petiole.

277. **Stipules** are certain leaf-like expansions, always in pairs, situated one on each side of the petiole near the base. They do not occur in every plant, but are pretty uniformly present in each species of the same natural order. In substance and color they usually resemble the leaf; sometimes they are colored like the stem, often they are membranous and colorless. In the Palmetto its substance is a coarse net-work resembling canvas.



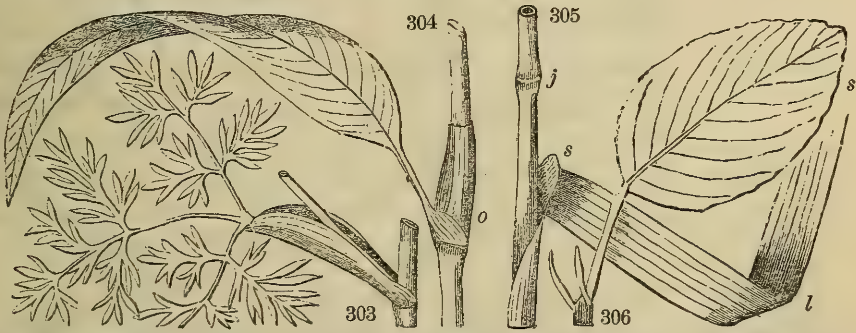
301, Rose leaf, odd-pinnate, with adnate stipules. 302, Violet (V. tricolor), with simple leaf (*l*), and free compound stipules.

278. Stipules are often *adnate*, or adherent to the petiole, as in the Rose; more generally they are free, as in the Pea and Pansy. In these cases and others they act the part of leaves; again they are very small and inconspicuous.

279. An *Ochrea* is a membranous sheath enclosing the stem from the node upward, as in the Knot-grass family (Polygonaceæ). It is formed of the two stipules cohering by their two margins. In case the two stipules cohere by their outer margin

only, a double stipule is formed opposite to the leaf, as in the Buttonwood. If they cohere by their inner margin, the double stipule appears in the leaf axil, as in the Pond-weed (Potamogèton). The *Ligule* of the Grasses is generally regarded as a double axillary stipule. The leaflets of compound leaves are sometimes furnished with little stipules, called *stipels.*

280. *Inter-petiolar* stipules occur in a few opposite-leaved tribes, as the Galium tribe. Here we find them as mere bristles in Diodia, while in Galium they look like the leaves, forming whorls. Such whorls, if complete, will be apparently 6-leaved, consisting of two true leaves and four stipules. But the adjacent stipules are often united, and the whorl becomes 4-leaved.

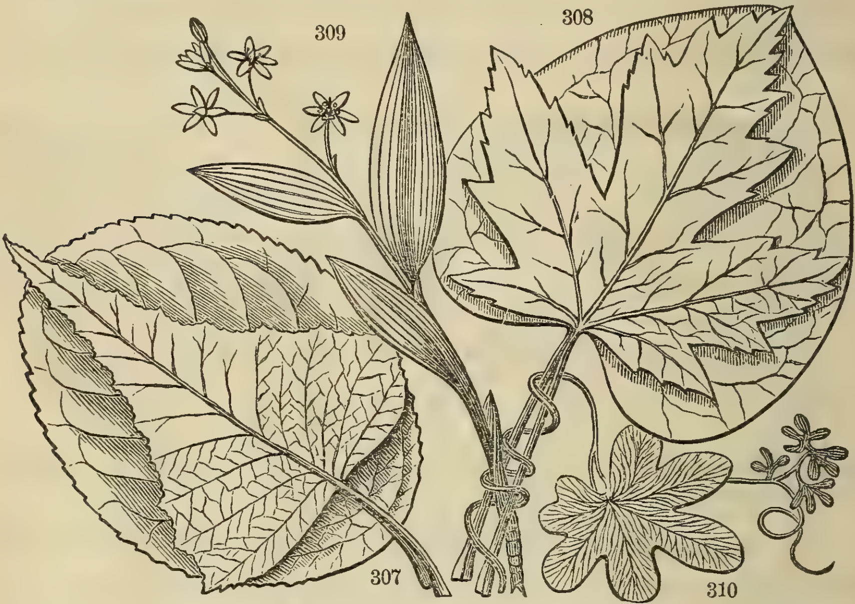


303, Leaf of Selinum, tripinnate, with sheathing petiole. 304, Leaf of Polygonum Pennsylvanicum, with its (*o*) ochrea. 305, Culm of Grass, with joint (*j*), leaf (*l*), ligule (*s*). 306, Leaf of Pear-tree, with slender stipules.

281. Stipules are often *fugacious*, existing as scales in the bud, and falling when the leaves expand, or soon after, as in the Magnolia and Tulip-tree.

282. **Nature of veins.** The blade of the leaf consists of, (1) the *frame-work*, and (2) the tissue commonly called the *parenchyma.* The frame-work is made up of the branching vessels of the footstalk, which are woody tubes pervading the parenchyma, and conveying nourishment to every part. Collectively, these vessels are called *veins*, from the analogy of their functions. VENATION is a term denoting the manner in which the veins are divided and distributed. The several organs of venation, differing from each other only in size and position, may be termed the midvein, veins, veinlets, and veinulets. (The old terms, *midrib* and *nerves*, being anatomically absurd, are here discarded.)

283. The *Midvein* is the principal axis of the venation, or prolongation of the petiole, running directly through the lamina, from base to apex, as seen in the leaf of the Oak or Birch. If there be several similar divisions of the petiole, radiating from the base of the leaf, they are appropriately termed *Veins;* and the leaf is said to be three-veined, five-veined, as in Maple. The primary branches sent off from the midvein or the veins we may term the *Veinlets*, and the secondary branches, or those sent off from the veinlets, are the *Veinulets.* These also branch and subdivide until they become too small to be seen.



Varieties of venation.—307, Feather-veined,—leaf of Betula populifolia (White Birch), lying upon a leaf of Plum-tree ; same venation with different outlines. 308, Palmate-veined,—leaf of White Maple, contrasted with leaf of Cercis Canadensis. 309, Parallel venation,—plant of "three-leaved Solomon's-seal" (Smilacina trifoliata). 310, Forked venation,—Climbing Fern (Lygodium).

284. Botanists distinguish three modes of venation, which are in general characteristic of *three Grand Divisions* of the Vegetable Kingdom—viz. :

Reticulate or *Net-veined*, as in the DICOTYLEDONS (called also EXOGENS). This kind of venation is characterized by the frequent reunion or inosculation of its numerously branching veins, so as to form a kind of irregular net-work.

Parallel-veined, as in the MONOCOTYLEDONS (called also ENDOGENS). The veins, whether straight or curved, run parallel, or side by side, to the apex of the leaf or to the margin, and are connected by simple transverse veinlets hardly seen.

Fork-veined, as in the Ferns (and other CRYPTOGAMS where veins are present at all). Here the veins divide and subdivide in a forked manner, and do not reunite.

285. Of the Reticulate venation the student should carefully note three leading forms: viz., The *Feather-veined* (pinni-veined) leaf is that in which the venation consists of a midvein giving off at intervals lateral veinlets and branching veinulets, as in the leaf of Beech, Chestnut. In the *Radiate-veined* (palmi-veined) leaf the venation consists of several veins of nearly equal size radiating from the base toward the circumference, each with its own system of veinlets. Ex., Maple, Crowfoot. Lastly, the *Tripli-veined* seems to be a form intermediate between the two former, where the lowest pair of veinlets are conspicuously stronger than the others, and extend with the midvein toward the summit (see fig. 319).

286. In parallel-veined venation the veins are either *straight*, as in the linear leaf of the Grasses; *curved*, as in the oval leaf of the Orchis; or *transverse*, as in the Canna, Calla, etc.

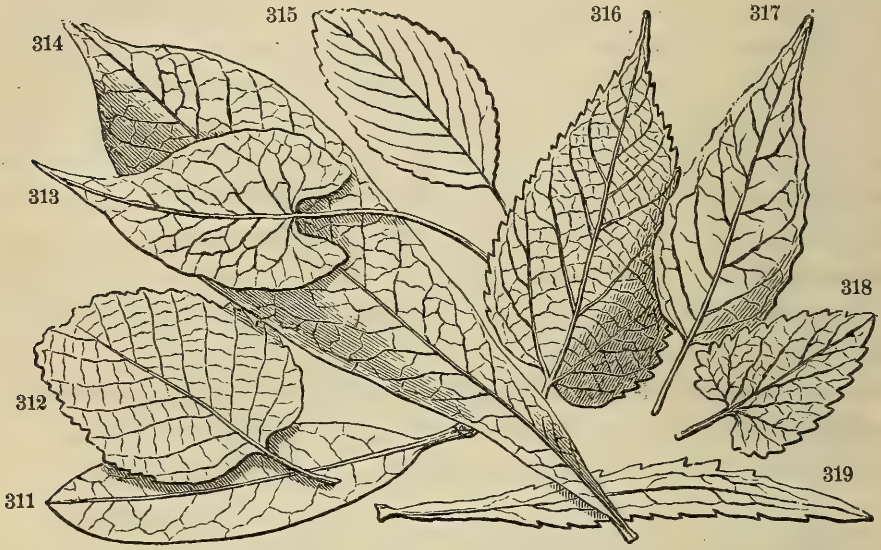
Review.—271. How does the leaf figure in landscape scenery? Its general character? What is the blade? The petiole? Explain sessile—Petiolate. 272. What are stipules? How many? Two special terms. 273. When is the leaf complete? Transformations. 274. Describe the petiole of Aspen—Of Aster, etc. What peculiar in the leaves of Mullein? What is amplexicaul? What constitutes a sheath? What figure? What are petiolules? 276. Distinguish simple and compound. 277. *Where* are the stipules? Appearance? Are they always present? 278. What of the Rose?—The Pansy? 279. What of Ochreæ? 280. What of the stipules of Galium?—Of Pond-weed?—Of Grasses?—Of Buttonwood? What are stipels? 282. Structure of the Blade. What is Venation? Its organs? Why *veins* rather than *ribs?* 283. Define Midvein. What leaf has such? Define vein, as in Maple. Veinlets. Veinulets. 284. Name and describe the Venation of the Exogens—Of the Endogens—Of the Ferns. 285. What leaf is pinni-veined?—Palmi-veined?—Tripli-veined? Parallel venation how varied?

CHAPTER XXI.

MORPHOLOGY OF THE LEAF—CONTINUED.

287. That infinite variety of beautiful and graceful forms for which the leaf is distinguished, becomes intelligible to the student only when viewed in connection with its venation. Since it is through the veins alone that nutriment is conveyed for the

development and extension of the parenchyma, it follows that there will be the greatest extension of outline where the veins are largest and most numerous. Consequently the *form* of the leaf will depend upon the direction of the veins and the vigor of their action in developing the intervening tissue. In accordance with this theory, leaf-forms will be classed in respect to their venation.



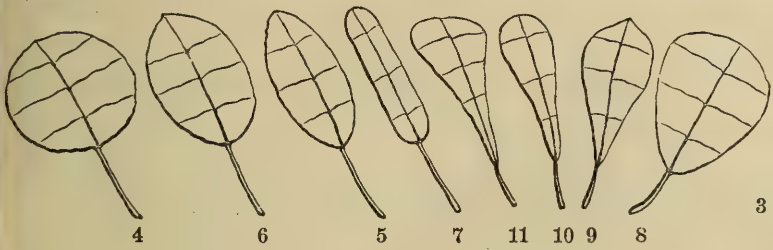
Forms of leaves.—311, Rhododendron maximum. 312, Alnus glutinosa (cult.). 313, Polygonum sagittatum. 314, Pawpaw. 315, Impatiens fulva. 316, Celtis Americana. 317, Circæa Lutetiana. 318, Catmint. 319, Solidago Canadensis—a tripli-veined leaf.

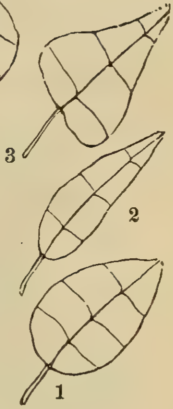
288. **Feather-veined leaves.** Of these, the following forms depend upon the length of the veinlets in relation to each other and to the midvein. *When the lower veinlets are longer* than the others, the form of the blade will be (1) *ovate*, with the outline of an egg, the broad end at the base; (2) *lanceolate*, or lance-shaped, narrower than ovate, tapering gradually upward; (3) *deltoid*, or triangular-shaped, like the Greek letter Δ.

289. If the middle veinlets exceed the others in length, the leaf will be (4) *orbicular*, roundish, or quite circular; (5) *elliptical*, with the outline of an ellipse, nearly twice longer than broad; (6) *oval*, broadly elliptical; (7) *oblong*, narrowly elliptical.

290. *When the veinlets are more largely developed in the upper* region of the leaf, its form becomes (8) *obovate*, inversely ovate, the narrow end at base; (9) *oblanceolate*, that is, lanceolate with

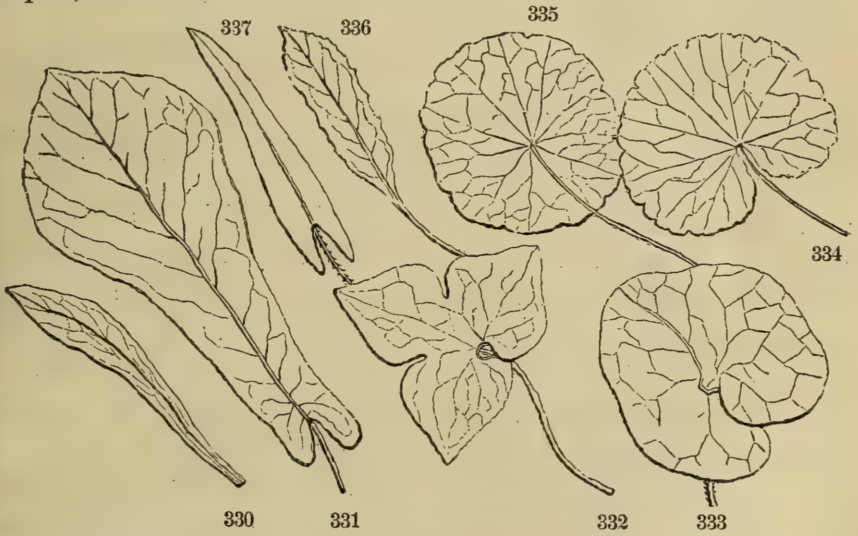
the narrow end at base; (10) *spatulate*, like a spatula, with a narrow base and a broader, rounded apex; (11) *cuneate* or *cuneiform*, shaped like a wedge with the point backward.





320–330, Diagrams of pinnate-veined leaf-forms.

291. Again: *if the lowest pair of veinlets are lengthened and more or less recurved*, the leaf will be variously modified in respect to its base, becoming (12) *cordate*, or heart-shaped, an ovate outline with a sinus or re-entering angle at base; (13) *auriculate*, with ear-shaped lobes at base; (14) *sagittate*, arrow-shaped, with the lobes pointed, and directed backward; (15) *hastate*, halbert-shaped, the lobes directed outward.

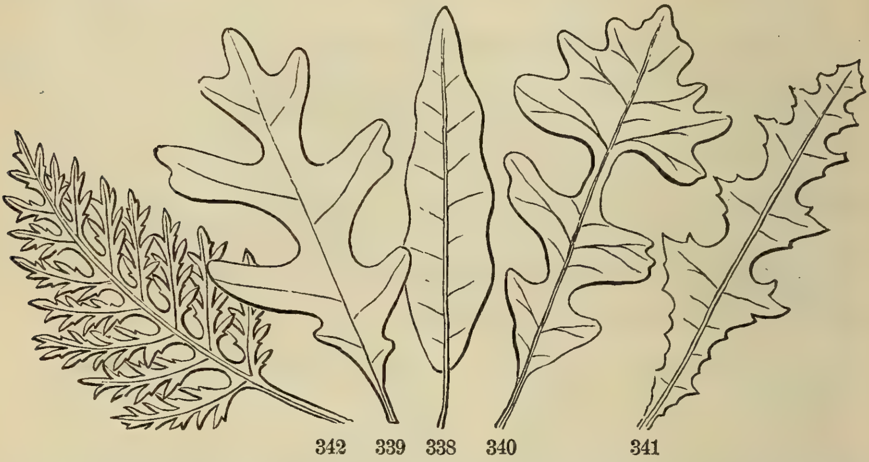


Forms of leaves.—330, Silene Virginica. 331, Magnolia Fraseri. 336, Arabis dentata. 337, Polygonum arifolium. 332, Hepatica acutiloba. 333, Asarum Virginicum. 334, Hydrocotyle Americana. 335, H. umbellata.

292. **Pinnatifid forms.** The following pinnate-veined forms, approaching the compound leaf, depend less upon the proportion of the veinlets than upon the relative development of the inter-

vening tissue. The prefix *pinnated* is obviously used in contrast with *palmated* among palmate-veined forms.

293. *Pinnatifid* (*pinna*, feather, *findo*, to cleave), feather-cleft, the tissue somewhat sharply cleft between the veinlets about half-way to the midvein, forming oblong segments. When the segments of a pinnatifid leaf are pointed and curved backward, it becomes *runcinate*, *i. e.*, re-uncinate. When the terminal segment of a pinnatifid leaf is orbicular in figure and larger than any other, presenting the form of the ancient lyre, the form is termed *lyrate.*

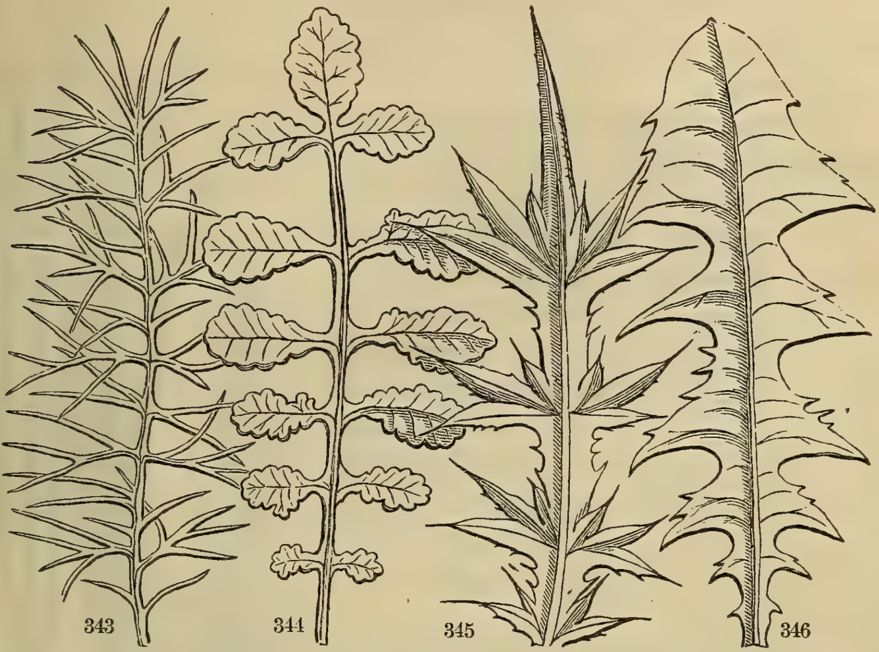


Feather-veined leaves, approaching the compound.—338, Quercus imbricaria—undulate. 339, Q. alba (White Oak)—lobate-sinuate. 340, Q. macrocarpa—lyrate. 341, Mulgedium (Milkweed). 342, Bipinnatifid leaf of Ambrosia artemisifolia (Hogweed).

294. *Pinnately parted* implies that the incisions are deeper than pinnatifid, nearly reaching the midvein. In either case the leaf is said to be *sinuate* when the incisions (sinuses) as well as the segments are rounded and flowing in outline. Such segments are *lobes*, and the leaves *lobate* or lobed, a very generic term.

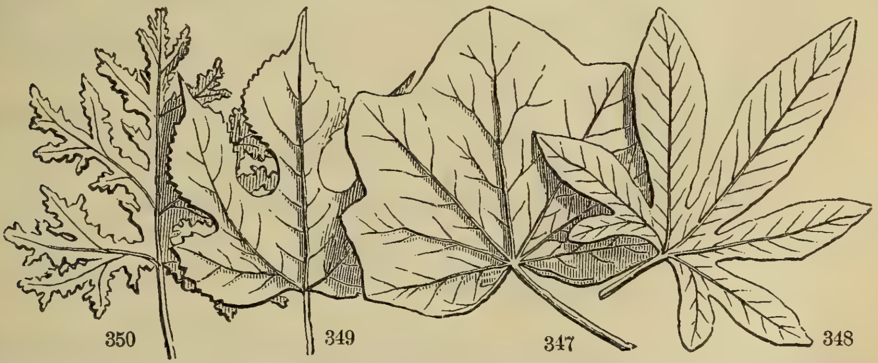
295. **Palmate forms.** The palmate venation presents us with a set of forms which are, in general, broader in proportion than the pinnate, having the breadth about equal to the length. Such a leaf may be rarely *broadly ovate*, or *broadly cordate*, terms which require no further explanation. Or it may be *Reniform*, kidney-shaped, having a flowing outline broader than long, concave at base; or *Peltate*, shield-form, the petiole not inserted at the margin, but in the midst of the lower surface of the blade. This singular form evidently results from the blend-

ing of the base lobes of a deeply cordate leaf, as seen in hydrocotyle. It may be orbicular, oval, etc.



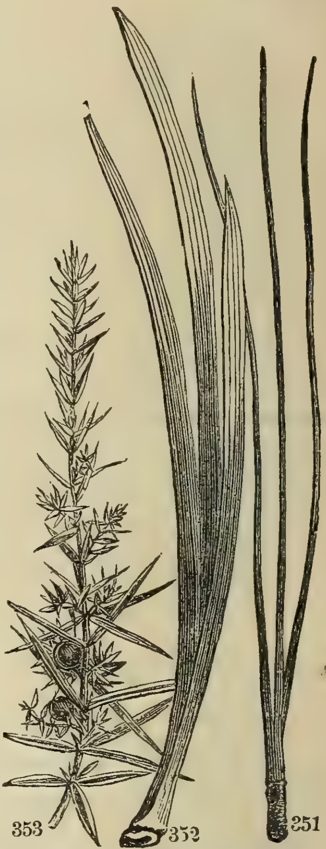
Feather-veined leaves almost compound.—343, Nigella (pinnatisect). 344, Cheledonium majus. 345, Thistle (Cirsium lanceolatum). 346, Dandelion (runcinate-lyrate).

296. The following result from deficiency of tissue, causing deep divisions between the veins. Leaves thus dissected are said to be *palmately-lobed* when either the segments or the sinuses are somewhat rounded and continuous. The number of lobes is denoted by such terms as *bilobate*, *trilobate*, *five-lobed*, etc. Leaves are *palmatety cleft* and *palmately parted*, according



Palmate-veined leaves.—347, Menispermum Canadense. 348, Passiflora cerulea. 349, Broussonetia papyrifera. 350, Oak Geranium.

to the depth of the incisions as above described. But the most peculiar modification is the *Pedate*, like a bird's foot, having the lowest pair of veins enlarged, recurved, and bearing each several of the segments (348).



351, Ensiform leaves of Iris. 352, Acerose leaves of Pinus. 353, Subulate leaves of Juniperus communis.

297. **The forms of the parallel-veined leaves** are remarkable for their even, flowing outlines, diversified solely by the direction and curvature of the veins. When the veins are straight, the most common form is the *Linear*, long and narrow, with parallel margins, like the leaves of the Grasses—a form which may also occur in the pinnate-veined leaf, when the veinlets are all equally shortened. The *ensiform*, or sword-shaped, is also linear, but has its edges vertical, that is, directed upward and downward.

298. If the veins curve, we may have the *lanceolate*, *elliptical*, or even *orbicular* forms; and if the lower curve downward, the *cordate*, *sagittate*, etc. Palmate forms there also are, splendidly developed in the Palmetto and other Palms, whose large leaves are appropriately called *flabelliform* (fan-shaped).

299. The leaves of the Pine and the Fir tribe (Coniferæ) generally are parallel-veined also, and remarkable for their contracted forms, in which there is no distinction of petiole or blade. Such are the *Acerose* (needle-shaped) leaves of the Pine, the *Subulate* (awl-shaped) and scale-form leaves of the Cedars, etc.

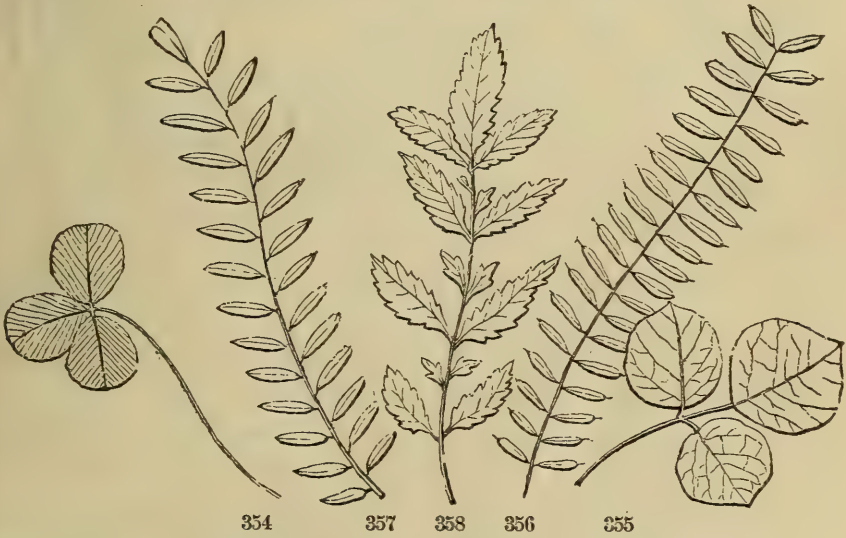
Review.—287. Account for the leaf's figure. What the principle of our classification? 288. Of feather-veined forms, define the first class. Define each special form. 289. The second class. Each special form. 290. The third class. Define an obovate leaf—An oblanceolate—A spatulate—A cuneate. 291. Define the fourth class. Distinguish four special forms. Apply the proper term to each figure (311–319). 292. On what do the pinnatifid forms depend? Describe the pinnatifid leaf—The runcinate—The lyrate. 294. What is pinnately-parted?—Sinuate? 295. What forms may a palmi-veined leaf take? Define reniform—Peltate. Observe (fig. 347–350) which is palmately cleft—Parted—Lobed. Define pedate. 297. What is remarked of the parallel-veined leaves? Examples of the linear—Ensiform—Accrose—Flabelliform—Subulate.

CHAPTER XXII.

THE COMPOUND LEAF, ETC.

300. If we conceive of a *simple* leaf becoming a *compound* one, on the principle of "deficiency of tissue between the veins," it will be evident that the same forms of venation are represented by the branching petioles of the latter as by the veins of the former. The number and arrangement of the parts will therefore in like manner correspond with the mode of venation.

301. The divisions of a compound leaf are called *leaflets;* and the same distinction of outline, margin, etc., occur in them as in simple leaves. The *petiolules* of the leaflets may or may not be articulated to the main petiole, or *rachis*, as it is called.

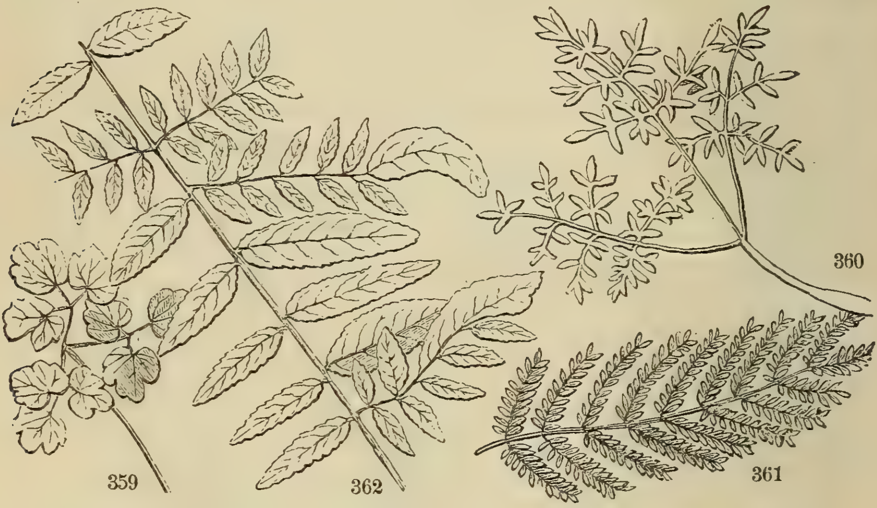


Compound leaves.—354, Trifolium repens. 355, Desmodium rotundifolium. 356, Sesbania. 357, Cassia. 358, Agrimonia.

302. **Pinnately compound.** From the pinnate-veined arrangement we may have the *pinnate* leaf, where the petiole (midvein) bears a row of leaflets on each side, either sessile or petiolulate, generally equal in number and opposite. It is *unequally pinnate* (357) when the rachis bears an odd terminal leaflet, and *equally pinnate* (356) when there is no terminal

leaflet, and *interruptedly pinnate* when the leaflets are alternately large and small (358).

303. The number of leaflets in the pinnate leaf varies from thirty pairs and upward (as in some Acacias), down to three, when the leaf is said to be *ternate* or *trifoliate ;* or two, becoming *binate ;* or finally even to *one* leaflet in the Lemon. Such a leaf is theoretically compound, on account of the leaflet (blade) being articulated to the petiole.



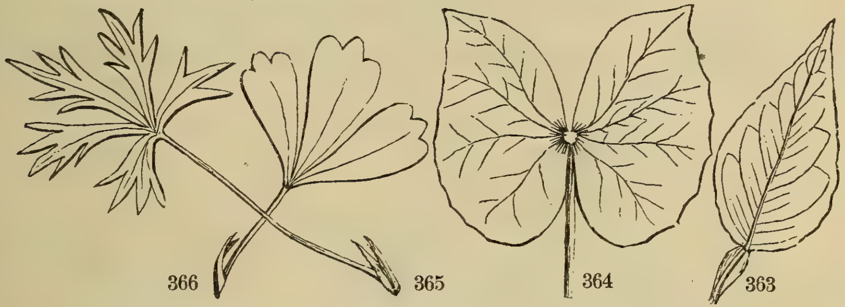
Compound leaves.—359, Clematis. 360, Erigenia bulbosa. 361. Acacia. 362, Honey-locust

304. A *bipinnate leaf* (twice pinnate) is formed when the rachis bears *pinnæ* or secondary pinnate leaves, instead of leaflets (361), and *tripinnate* (thrice pinnate) when pinnæ take the places of the leaflets of a bipinnate leaf (360). When the division is still more complicated, the leaf is *decompound.* Different degrees of division often exist in different parts of the same leaf, illustrating the gradual transition of leaves from simple to compound in all stages. The leaves of the Honey-locust and Coffee-tree (Gymnocladus) often afford curious and instructive examples (362).

305. A *biternate leaf* is formed when the leaflets of a ternate leaf give place themselves to ternate leaves (359), and *triternate* when the leaflets of a biternate leaf again give place to ternate leaves.

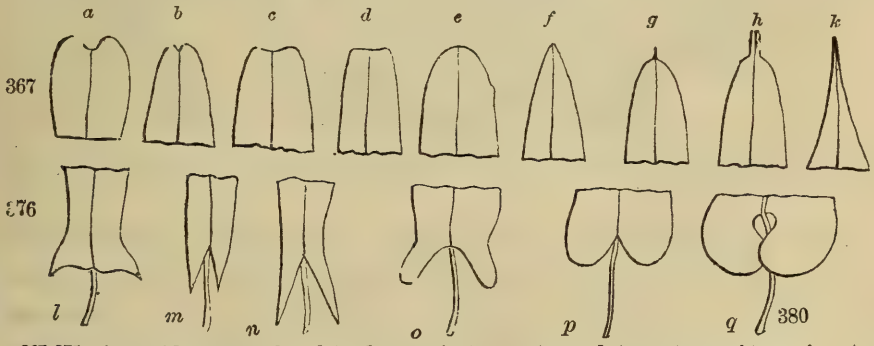
306. **Palmately compound.** The palmate venation has

also its peculiar forms of compound leaves, as ternate, quinate, septinate, etc., according to the number of leaflets which arise together from the summit of the petiole. Ternate leaves of this venation are to be carefully distinguished from those of the pinnate plan. The palmately ternate leaf consists of three leaflets, which are either all sessile or stalked alike; the pinnately ternate has the terminal leaflet raised above the other two on the prolonged rachis (354, 355).



363, Lemon. 364, Jeffersonia. 365, Potentilla anserina. 366, P. tridentata.

307. **Apex.** In regard to the termination of a leaf or leaflet at its apex, it may be *acuminate*, ending with a long, tapering point; *cuspidate*, abruptly contracted to a sharp, slender point; *mucronate*, tipped with a spiny point; *acute*, simply ending with an angle; *obtuse*, rounded at the point. Or the leaf may end without a point, being *truncate*, as if cut square off; *retuse*, with a rounded end slightly depressed where the point should be; *emarginate*, having a small notch at the end; *obcordate*, inversely heart-shaped, having a deep indentation at the end.

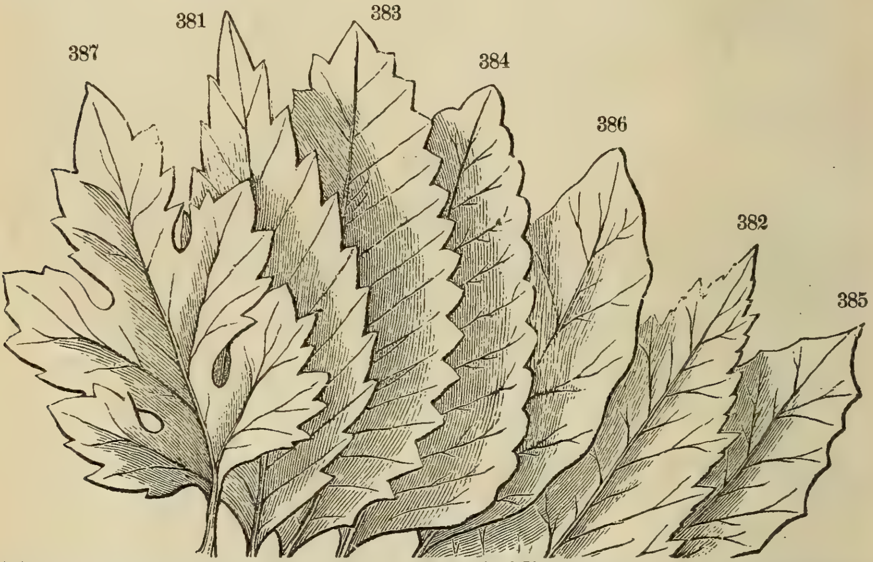


367–375, *Apex of leaves.* *a*, obcordate; *b*, emarginate; *c*, retuse; *d*, truncate; *e*, obtuse: *f*, acute; *g*, mucronate; *h*, cuspidate; *k*, acuminate.
376–380, *Bases of leaves.* *l*, hastate; *m*, *n*, sagittate; *o*, auriculate; *p*, cordate; *q*, reniform.

308. **Margin.** The following terms are used to define the

margin of the leaf or leaflet, with no reference to the general form. If the leaf be even-edged, having the tissue completely filled out, the appropriate term is, *entire.* Sometimes a vein runs along such a margin as if a *hem.*

309. But when the marginal tissue is deficient, the leaf becomes *dentate*, having sharp teeth pointing outward from the centre; *serrate*, with sharp teeth pointing forward, like the teeth of a saw; *crenate*, with rounded or blunt teeth. The terms *denticulate*, *serrulate*, *crenulate*, denote finer indentations of the several kinds; *doubly dentate*, etc., denote that the teeth are themselves toothed.

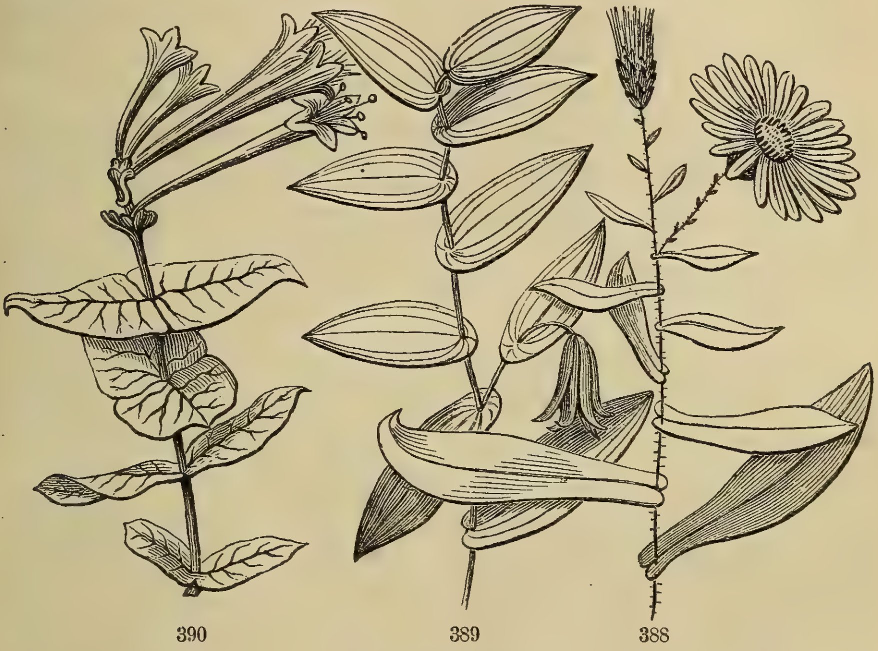


381, Serrate leaf of Chestnut. 382, Doubly serrate leaf of Elm. 383, Dentate leaf of Arrow-wood. 384, Crenate leaf of Catmint. 385, Repand leaf of Circæa. 386, Undulate leaf of Shingle Oak. 387, Lobed leaf of Chrysanthemum.

310. The *undulate*, or wavy edge, is somewhat different from the *repand*, which bends like the margin of an umbrella. If the veins project, and are tipped with spines, the leaf becomes *spinous.* Irregularly divided margins are said to be *erose* or jagged, *laciniate* or torn, *incised* or cut. Often, instead of a deficiency, there is a superabundance of marginal tissue, dedenoted by the term *crispate* or crisped.

311. **Insertion.** Several important terms descriptive of the various modes of leaf-insertion must here be noticed. A sessile leaf is said to be *amplexicaul* when its base lobes adhere to and

clasp the stem. Should these lobes extend quite around the stem and become blended together, on the other side a *perfoliate* leaf will be formed (*per*, through, *folium*, leaf), the stem seeming to pass through the leaves. When the bases of two opposite sessile leaves are so united as to form one piece of the two, they are said to be *connate.*



Insertion of leaves.—388, Aster lævis (amplexicaul). 389, Uvularia perfoliata. 390, Lonicera sempervirens (connate).

312. **Surface.** The following terms are applicable to any other organs as well as leaves. In the quality of surface the leaf may be *glabrous* (smooth), destitute of all hairs, bristles, etc., or *scabrous* (rough), with minute, hard points, hardly visible. A dense coat of hairs will render the leaf *pubescent* when the hairs are soft and short; *villous* when they are rather long and weak; *sericeous*, or silky, when close and satin-like: such a coat may also be *lanuginous*, woolly; *tomentous*, matted like felt; or *floccose*, in soft, fleecy tufts.

313. Thinly scattered hairs render the surface *hirsute* when they are long; *pilous* when short and soft; *hispid* when short and stiff. The surface will be *setous* when beset with bristly hairs called *setæ;* and *spinous* when beset with spines, as in the

Thistle and Horse-nettle. Leaves may also be armed with *stinging* hairs which are sharp and tubular, containing a poisonous fluid, as in Nettles and Jatropha stimulans (503).

314. A *pruinous* surface is covered with a bluish-white waxy powder, called *bloom*, as in the Cabbage; and a punctate leaf is dotted with colored points or pellucid glands.

315. **In texture** leaves may be *membranous*, or *coriaceous* (leathery), or *succulent* (fleshy), or *scarious* (dry), *rugous* (wrinkled), etc., which terms need only to be mentioned.

316. **Double terms.** The modifications of leaves are almost endless. Many other terms are defined in the glossary, yet it will often be found necessary in the exact description of a plant to combine two or more of the terms defined in order to express some intermediate figure or quality; thus *ovate-lanceolate*, signifying a form between ovate and lanceolate, etc.

317. The Latin preposition *sub* (under) prefixed to a descriptive term denotes the quality which the term expresses, in a lower degree, as *subsessile*, nearly sessile, *subserrate*, somewhat serrate.

Review.—300. How a simple leaf may become compound. 301. What are the leafiets? —The petiolules?—The rachis? 302. Describe the pinnate leaf. What sort is fig. 356?—357?—358? 303. Numbers of leaflets?—In trifoliate?—In binate? What of the Lemon leaf? What is bipinnate?—Tripinnate?—Decompound? What singularity in the leaf of Honey-locust? Define a biternate leaf.—A triternate. Distinguish *palmately* and *pinnately* ternate. What kind of leaf-form is fig. 355?—359?—365? Name and define the acuminate, and other forms of leaf-points. What leaf is truncate?—Emarginate? etc. 309. Speaking merely of the margin, when is it entire?—Dentate?—Serrate?—Crenate? What if the teeth are fine?—Doubly serrate? 310. Undulate? Erose? Crisped? 312. As to surface, what is glabrous?—Scabrous? With a dense coat of hairs, mention six modifications. Distinguish hirsute—Pilous—Hispid. Also setous, spinous. 314. What covers the pruinous surface? Explain such terms as ovate-lanceolate. Use of *sub?* Explain fig. 388, 389, 390.

CHAPTER XXIII.

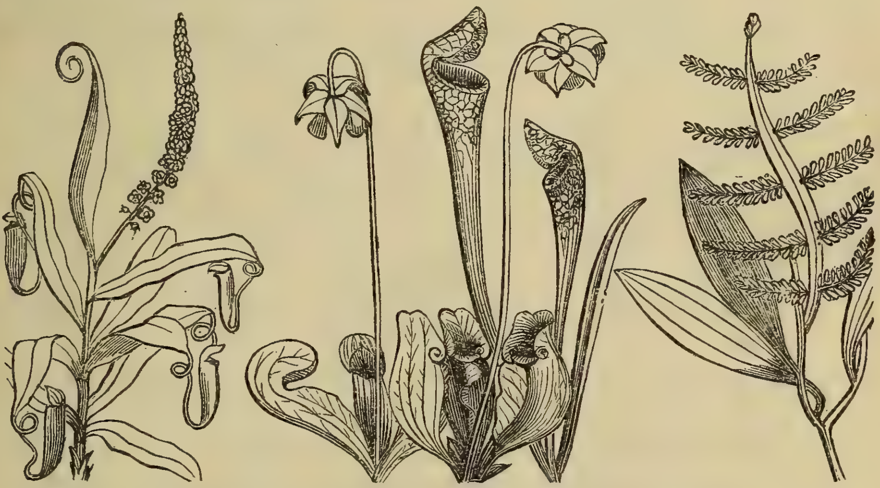
TRANSFORMATIONS OF THE LEAF.

318. Hitherto we have considered the leaf as foliage merely—constituted the fit organ of aeration by its large expansion of surface. This is indeed the chief, but not the only aspect in which it is to be viewed. The leaf is a typical form; that is, a type, or an IDEA of the Divine Architect, whence is derived the form of every other appendage of the plant. To trace out this idea in all the disguises under which it lurks, is one of the first aims of the botanist. Several of these forms of disguise have already been noticed—for example:

319. **The scales** which clothe the various forms of scale-

stems are leaves, or more usually *petioles*, reduced and distorted, perhaps by the straitened circumstances of their underground growth. The scales of corms and rhizomas are mostly mere membranes, while those of the bulb are fleshy, serving as depositories of food for the future use of the plant. That these scales are leaves is evident—1st, from their position at the nodes of the stem; 2d, from their occasional development into true leaves. Of the same nature are the brown scales of Winter buds.

320. **The cotyledons** of seeds or seed-lobes are readily recognized as leaves, especially when they arise above-ground in germination, and form the first pair upon the young plant; as in the Beechnut and Squash-seed. Their deformity is due to the starchy deposits with which they are crammed for the nourishment of the embryo when germinating, and also to the way in which they are packed in the seed.



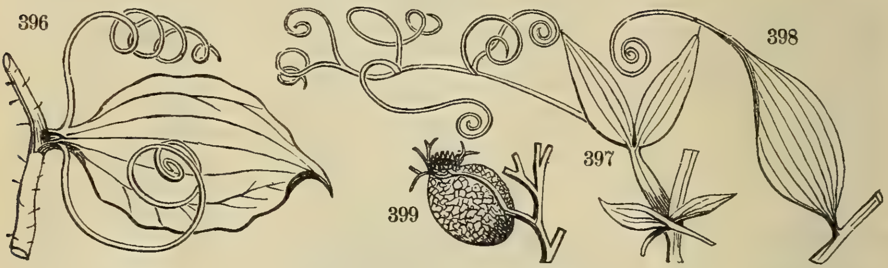
Ascidia.—391, Nepenthes. 392, Sarracenia psittacina. 393, S. purpurea. 394, S. Gronovii, β. Drummondii. 395, Acacia heterophylla—its phyllodia.

321. **Phyllodia** are certain leaf-forms, consisting of petioles excessively compressed, or expanded vertically into margins, while the true lamina is partly or entirely suppressed. Fine examples are seen in our greenhouse Acacias from Australia. Their vertical or edgewise position readily distinguishes them from true leaves.

322. **Ascidia**, *or pitchers*, are surprising forms of leaves, ex-

pressly contrived, as if by art, for holding water. The pitchers of Sarracenia, whose several species are common in bogs North and South, are evidently formed by the blending of the involute margins of the broadly winged petioles, so as to form a complete vase. The broad expansion which appears at the top may be regarded as the lamina. These pitchers contain water, in which insects are drowned, being prevented from escaping by the deflexed hairs at the mouth. Other pitcher-bearing plants are equally curious; as Darlingtonia of California, Nepenthes and Dischidia of the East Indies. In Dionæa of North Carolina, the leaves are transformed to spiny, snapping fly-traps!

323. Many weak-stemmed water-plants are furnished with *Air-bladders*, or little sacks filled with air to buoy them up near to the surface. Such are the bladders of the common Bladderwort, formed from the leaf-lobes. In the Horned-bladderwort, the floats are made of the six upper inflated petioles lying upon the surface of the water like a wheel-shaped raft, and sustaining the flower upon its own elevated stalk.



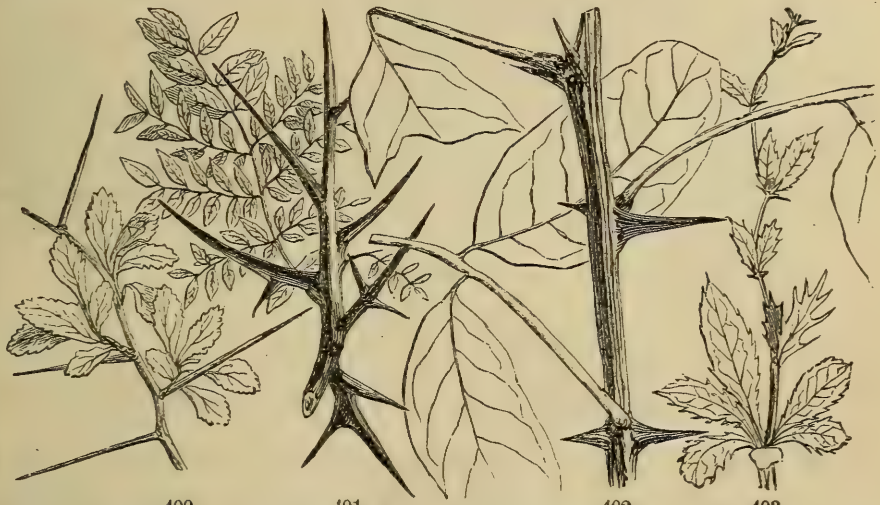
396, Leaf of Greenbrier, with tendrils in place of stipules. 397, Leaf of Everlasting Pea—tendrils at end of rachis. 398, Leaf of Gloriosa—apex ends in a tendril. 399, Air-bladder of Horn Pondweed.

324. **The Tendril** is a thread-like, coiling appendage, furnished to certain weak-stemmed plants as their means of support in place. Its first growth is straight, and it remains so until it reaches some object, when it immediately coils itself about it, and thus acquires a firm though elastic hold. This beautiful appendage is finely exemplified in the Cucurbitaceæ and Grape, above cited; also in many species of the Pea tribe (Leguminosæ), where it is appended to the leaves. It is not a new organ, but some old one transformed and adapted to a new purpose. In Gloriosa superba, the midvein of the leaf is prolonged beyond the blade into a coiling tendril. In the Pea, Vetch, etc., the

tendrils represent the attenuated leaf-blades themselves. Again, the entire leaf sometimes becomes a tendril in Lathyrus, while the stipules act as leaves.

325. The petiole of the leaf of Clematis, otherwise unchanged, coils like a tendril for the support of the vine. In the Greenbrier, the stipules are changed to tendrils, which thus arise in pairs from the base of the petioles. So probably in the Gourd.

326. But the tendrils of the Grapevine are of a different nature. From their position opposite the leaves, and the tubercles occasionally seen upon them, representing flower-buds, they are inferred to be abortive, or transformed flower-stalks.



Thorns—400, Cratægus parvifolia (thorns axillary). 401, Honey-locust. 402, Common Locust. 403, Berberis—*a*, *a*, its thorns.

327. Many plants are armed, as if for self-defence, with hard, sharp-pointed, woody processes, called *spines* or *thorns.* Those which are properly called spines originate from leaves. In Berberis the spines are evidently transformed leaves, as the same plant exhibits leaves in every stage of the metamorphosis. In Goat's-thorn (Astragalus tragacanthus) of S. Europe, the petioles change to spines after the leaflets fall off. In the Locust (Robinia), there is a pair of spines at the base of the petiole, in place of stipules.

328. *Thorns* originate from axillary buds, and are abortive branches. This is evident from their position in the Hawthorn and Osage-orange. The Apple and Pear tree in their wild state produce thorns, but by cultivation become thornless; that is, the axillary buds, through better tillage, develop branches instead of thorns. The terrible

branching thorns of the Honey-locust originate just above the axil, from *accessory* buds. *Prickles* differ from either spines or thorns, growing from the epidermis upon stems or leaves, at no determinate point, and consisting of hardened cellular tissues, as in the Rose, Bramble.

329. By a more gentle transformation, leaves pass into *Bracts*, which are those smaller, reduced leaf-forms situated near and among the flowers. So gradual is the transition from leaves to bracts—in the Peony, *e. g.*—that no absolute limits can be assigned. Equally gradual is the transition from bracts to sepals of the flower—affording a beautiful illustration of the doctrine of metamorphosis (§ 330, etc.) Bracts will be further considered under the head of Inflorescence.

Review.—317. Early aim of the botanist? 319. Prove that scales are transformed leaves. Three varieties of such scales. 320. Nature of the cotyledons? Proof? Why so deformed? 321. What are the "leaves" of Acacia? 322. Give the nature of ascidia—The four examples given. What of the leaves of Dionæa? 323. Use of air-bladders? 324. Use of the tendril? Is this a *new* organ? Whence that of Pea?—Lathyrus?—Gloriosa? In Clematis what organs serve as tendrils?—In Greenbrier?—In the Grapevine? 327. Nature of the spines in Berberis?—Goat's-thorn?—Locust? 328. The thorn of a different nature. When do trees lose their thorns? What are prickles? 329. Nature of Bracts?

CHAPTER XXIV.

METAMORPHOSIS OF THE FLOWER.

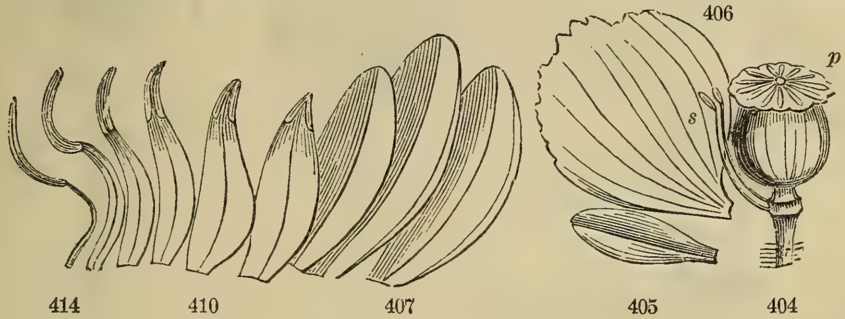
330. It has already been announced (§ 37) that a flower is a metamorphosed, that is, a transformed branch. No *new* principle or element was devised to meet this new necessity in the life of the plant, viz., the perpetuation of its kind; but *the leaf*, that same protean form which we have already detected in shapes so numerous and diverse, THE LEAF, is yet once more in nature's hand moulded into a series of forms of superior elegance, touched with colors more brilliant, and adapted to a higher sphere as *the organs of reproduction.*

331. Proofs of this doctrine appear on every hand, both in the *natural* and in the *artificial* development of plants. We mention a few instances. The thoughtful student will observe many more.

332. In most flowers, as in the Poppy, very little evidence of the *metamorphosis* appears, simply because it has been so complete. Its sepals, petals, stamens, and pistils—how unlike!

Can these be of one and the same element? Look again. Here is a double flower, a Poppy of the gardens, *artificially* developed; its slender white stamens have indeed expanded into broad red petals!

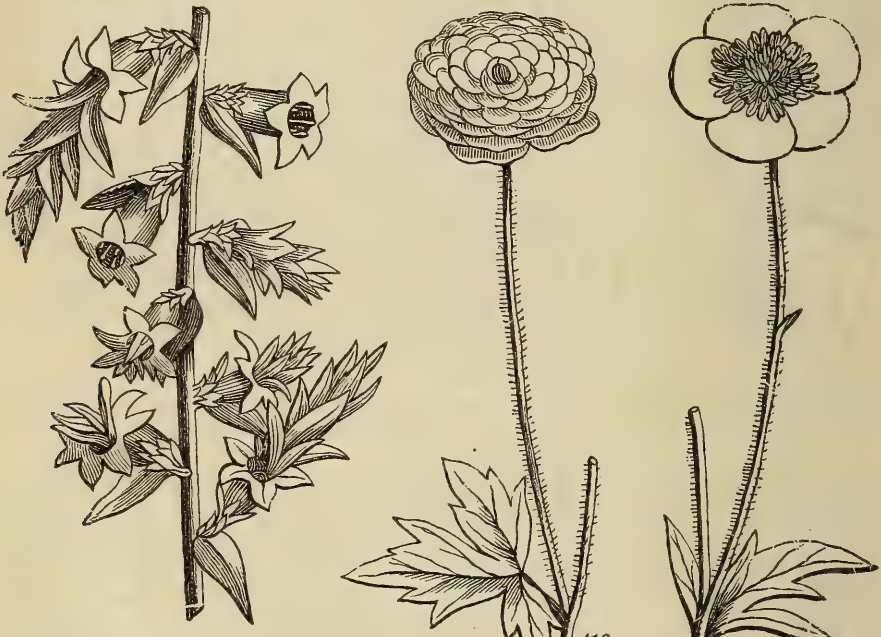
333. The argument begins with the sepals. In the Rose and Pæony, and in most flowers, the sepals have all the characteristics of leaves—color, form, venation, etc. The transition from leaves to bracts and from bracts to sepals is so gradual as to place their identity beyond doubt. Again, in Calicanthus, the sepals pass by insensible gradations into petals; and in the Lilies these two organs are almost identical. Hence, if the sepals are leaves, *the petals are leaves also.* In respect to the nature of the stamens, the Water-lily is particularly instructive. Here we see a perfect gradation of forms from stamens to petals, and thence to sepals, where, half-way between the two former, we find a narrow petal tipped with the semblance of an anther (410). Finally, cases of close resemblance between stamen and pistil, so unlike in the Poppy, are not wanting. For example, the Tulip-tree.



404, Papaver (poppy)—*s*, stamens; *p*, stigmas. 405, Sepal. 406, Petal—all very different. 407, Petals of the Water-lily (Nymphæa) gradually passing into stamens.

334. **Teratology.** Cases in ARTIFICIAL DEVELOPMENT where organs of one kind are converted into those of another kind by cultivation, afford undeniable evidence of the doctrine in question—*the homology of all the floral organs with each other and with the leaf.* Such cases are frequent in the garden, and, however much admired, they are *monstrous*, because unnatural. In all double flowers, as Rose, Pæony, Camellia, the stamens have been reconverted into petals, either wholly or partially, some yet remaining in every conceivable stage of the transition. In the double Butter-cup (416) the pistils as well as stamens revert to petals, and in the garden Cherry, Flowering Almond, a pair of green leaves occupy the place of the pistils. By still further changes all parts of the flower manifest their foliage-affinities, and the entire flower-bud, after having given clear indications of its floral character, is at last developed into a leafy branch (417). Further evidence of this view will appear in the—

335. **Æstivation of the flower-bud.** This term (from *æstivus*, of Summer) refers to the arrangement of the floral envelopes while yet in the bud. It is an important subject, since in general the same mode of æstivation regularly characterizes whole tribes or orders. It is to the flower-bud what vernation (*vernus*, Spring) is to the leaf-bud. The various modes of æstivation are best observed in sections of the bud made by cutting it through horizontally when just ready to open. From such sections our diagrams are copied.



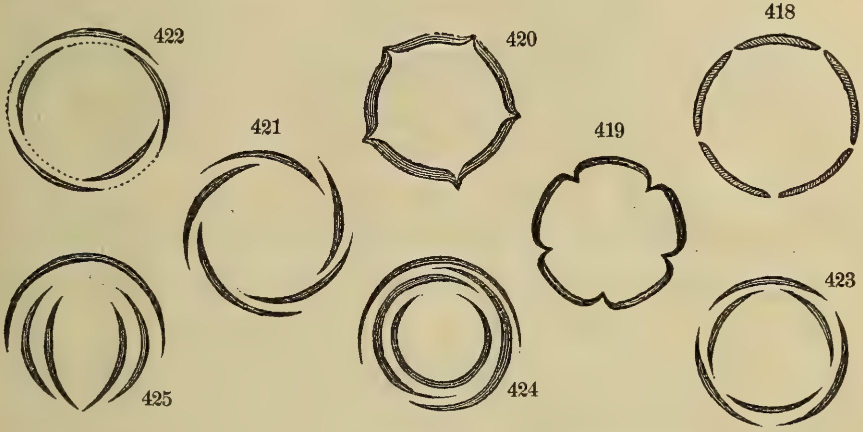
415, Ranunculus acris; a single flower. 416, R. acris, β. plena, a double flower. 417, Epacris impressa; the flowers changing to leafy branches (Lindley).

336. Separately considered, we find each organ here folded in ways similar to those of the leaf-bud; that is, the sepal or the petal may be *convolute*, *involute*, *revolute*, etc., terms already defined. Collectively considered, the æstivation of the flower occurs in four general modes with their variations—the valvate, the contorted, imbricate, and plicate.

337. **In valvate æstivation** the pieces meet by their margins without any overlapping; as in the sepals of the Mallow, petals of Hydrangea, valves of a capsule. The following va-

rieties of the valvate occur: *Induplicate*, where each piece is involute—*i. e.*, has its two margins bent or rolled inward, as in Clematis; or *reduplicate*, when each piece is revolute—having its margins bent or rolled outward, as in the sepals of Althea rosea (419, 420).

338. **Contorted æstivation** is where each piece overlaps its neighbor, all in the same direction, appearing as if twisted together, as in Phlox, Flax, Oleander (421).

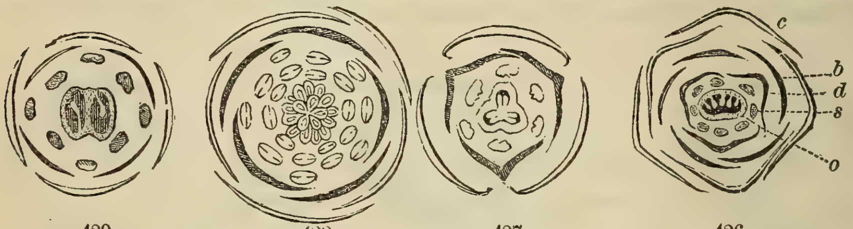


418–425, Modes of æstivation. 424, Petals of the Wall-flower.

339. **Imbricated æstivation** (*imbrex*, a tile) is a term restricted to those modes in which one or more of the petals or sepals is wholly outside, overlapping two others by both its margins. This kind of æstivation naturally results from the spiral arrangements so common in phyllotaxy, while the valvate and contorted seem identified with the opposite or whorled arrangement. The principal varieties are the following: The *Quincuncial*, consisting of five leaves, two of which are wholly without, two wholly within, and one partly both, or one margin out, the other in, as in the Rose family (422). This accompanies the *two-fifths cycle* in phyllotaxy, and corresponds precisely with it, each quincunx being in fact a cycle with its internodes suppressed. (See fig. 300, and § 266.) The *Triquetrous*, consisting of three leaves in each set, one of which is outside, one inside, and the third partly both, as in Tulip, Erythronium, agreeing with the *two-thirds*, or Alder Cycle (§ 265). The *Convolute*, when each leaf wholly involves all that are within it, as

do the petals of Magnolia; and lastly, the *Vexillary*, when one piece larger than the rest is folded over them, as in Pea (425).

340. **Plicate** or folded æstivation occurs in tubular or monopetalous flowers, and has many varieties, of which the most remarkable is the *supervolute*, where the projecting folds all turn obliquely in the same direction, as in the Morning-glory, Thorn-apple (Datura).



429 428 427 426

Diagrams of flowers (as seen by cross-sections).—426, Jeffersonia diphylla—*o*, ovary; *s*, stamens; *d*, inner row of petals, æstivation triquetrous; *b*, outer row of petals, æstivation contorted; *c*, sepals, æstivation quincuncial. 427, Lily. 428, Strawberry. 429, Mustard. The pupil will designate modes of æstivation.

It will be seen by the cuts that different modes of æstivation may occur in the different whorls of the same flower.

Review.—330. What is the meaning of Metamorphosis? Is the Flower a *new* principle? Whence is it? 331. Two sources of proof. 332. What is said of the Poppy? 333. State the first argument. What is proved by this? Prove that the petals are leaves. Argument from the Water-lily—From the Tulip-tree. 334. Define Teratology. State once more the point to be proved. What are monstrous flowers? How does the Rose become double? Change in the Double Cherry?—In Buttercups?—In fig. 417? 335. Meaning of Æstivation? Why is the subject important? Meaning of Vernation? How to observe them? 336. Four general modes of Æstivation. 337. Define the Valvate—Its two varieties. 338. Define the Contorted. 339. Define the Imbricated—The Quincuncial—Triquetrous—Convolute. How is it in the Pea? Describe the æstivation of Convolvulus.

CHAPTER XXV.

INFLORESCENCE.

341. Inflorescence is a term denoting the arrangement of the flowers and their position upon the plant.

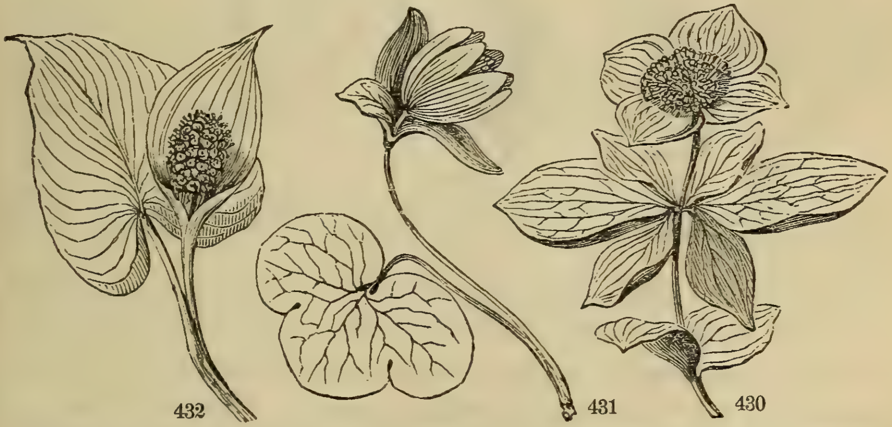
All the buds of a plant are supposed to be *originally* of one and the same nature, looking to the production of vegetative organs only. But at a certain period, a portion of the buds of the living plant, by an unerring instinct little understood, are converted from their ordinary intention into *flower-buds*, as stated and illustrated in the foregoing Chapter. The flower-bud is incapable of extension. While the leaf-bud may unfold leaf after leaf, and node after node, to an indefinite extent, the flower-bud blooms, dies, and arrests forever the extension of the axis which bore it.

342. In position and arrangement, flower-buds cannot differ from leaf-buds, and both are settled by the same unerring law

which determines the arrangement of the leaves. Accordingly, the flower-bud is always found either *terminal* or *axillary*. In either case, a single bud may develop either a *compound* inflorescence, consisting of several flowers with their stalks and bracts, or a *solitary* inflorescence, consisting of a single flower.

343. The *Peduncle* is the flower-stalk. It bears no leaves, or at least only such as are reduced in size and changed in form, called *bracts*. If the peduncle is wanting, the flower is said to be *sessile*. The simple peduncle bears a single flower; but if the peduncle be divided into branches, it bears several flowers, and the final divisions, bearing each a single flower, are called *pedicels*. The main stem or axis of a compound peduncle is called the *rachis*.

344. The *Scape* is a flower-stalk which springs from a subterranean stem, in such plants as are called stemless or acaulescent; as the Primrose, Tulip, Bloodroot. Like the peduncle, it is leafless or with bracts only, and may be either simple or branched. The flower-stalk, whether peduncle, scape, or pedicel, always terminates in the *torus* (§ 57).



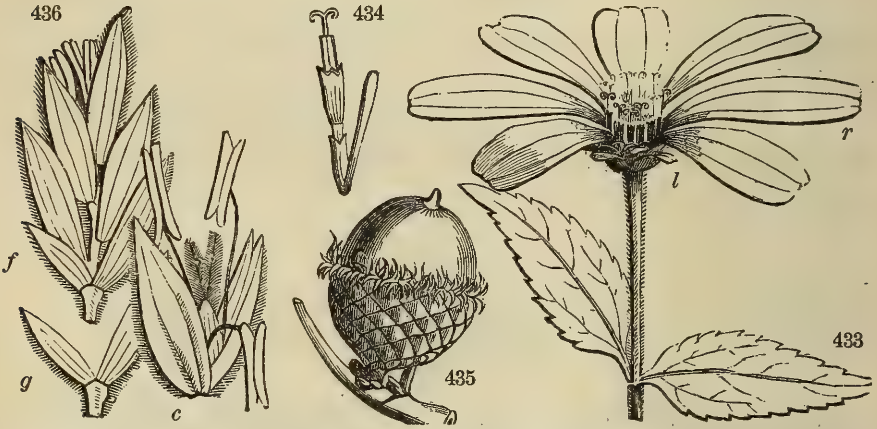
Bracts (*b*, *b*, *b*).—430, Cornus Canadensis, with an involucre of 4 colored bracts. 431, Hepatica triloba, with an involucre of 3 green bracts. 432, Calla palustris, with a colored spathe of one bract.

345. **Bracts.** The branches of the inflorescence arise from the axils of reduced leaves, called *bracts*. Those leaves, still smaller, growing upon the pedicels, are called *bractlets*. Bracts are usually simple in outline and smaller than the leaf, often gradually diminishing to mere points, as in Aster, or even totally

suppressed, as in the Cruciferæ. Often they are colored, sometimes brilliantly, as in Painted-cup. Sometimes they are scale-like, and again they are evanescent membranes.

346. The *Spathe* is a large bract formed in some of the Monocotyledons, enveloping the inflorescence, and often colored, as in Arum, Calla; or membranous, as in Onion and Daffodil.

347. Bracts also constitute an *Involucre* when they are collected into a whorl or spiral group. In the Phlox, Dodecatheon, and generally, the involucre is green, but sometimes colored and petaloid, as in Dogwood and Euphorbia. Situated at the base of a compound umbel, it is called a *general* involucre; at the base of a partial umbel it is a *partial* involucre or *involucel*, both of which are seen in the Umbelliferæ.



433, Helianthus grosse-serratus—*l*, involucre; *r*, rays, or ligulate flowers. 434, One of the disk-flowers with its chaff-scale (bract). 435, Acorn of Moss-cup Oak (Q. macrophylla). 436, Poa pratensis—*f*, spikelet entire; *g*, glumes separated; *c*, a flower separated, displaying the two pales, 3 stamens and 2 styles.

348. In the Compositæ, where the flowers are crowded upon a common torus, forming what is called a *compound flower*, an involucre composed of many imbricated scales (bracts) surrounds them as a calyx surrounds a simple flower. The chaff also upon the torus are bracts to which each floret is axillary (434).

349. In the Grasses, the bracts subsist under the general name of *chaff*. At the base of each *spikelet* (436) of flowers we find two bracts—the *Glumes*. At the base of each separate flower in the spikelet are also two bractlets—the *Pales*—enveloping as a calyx the three stamens and two styles (*c*).

350. The cup of the Acorn is another example of involucre,

composed of many scale-like bractlets. So, also, perhaps the burr of the Chestnut, etc.

351. The forms of inflorescence are exceedingly various, but may all be referred to two classes, as already indicated—the *axillary*, in which all the flowers arise from axillary buds; the *terminal*, in which all the flower-buds are terminal.

352. *Axillary inflorescence* is called *indefinite*, because the axis, being terminated by a leaf-bud, continues to grow on indefinitely, developing bracts with their axillary flowers as it grows. It is also called *centripetal*, because in the order of time the blossoming commences with the circumference (or base) of the inflorescence, and proceeds toward the central or terminal bud, as in Hawthorn or Mustard.

353. *Terminal inflorescence*, on the other hand, is *definite*, implying that the growth of the axis as well as of each branch is definitely arrested and cut short by a flower. It is also *centrifugal*, because the blossoming commences with the central flower and proceeds in order to the circumference, as in the Sweet-William, Elder, Hydrangea.

354. Both kinds of inflorescence are occasionally combined in the same plant, where the *general* system may be distinguished from the *partial* clusters which compose it. Thus in the Compositæ, while the florets of each head open centripetally, the general inflorescence is centrifugal, that is, the terminal head is developed before the lateral ones. But in the Labiatæ the partial clusters (verticillasters) open centrifugally, while the general inflorescence is indefinite, proceeding from the base upward.

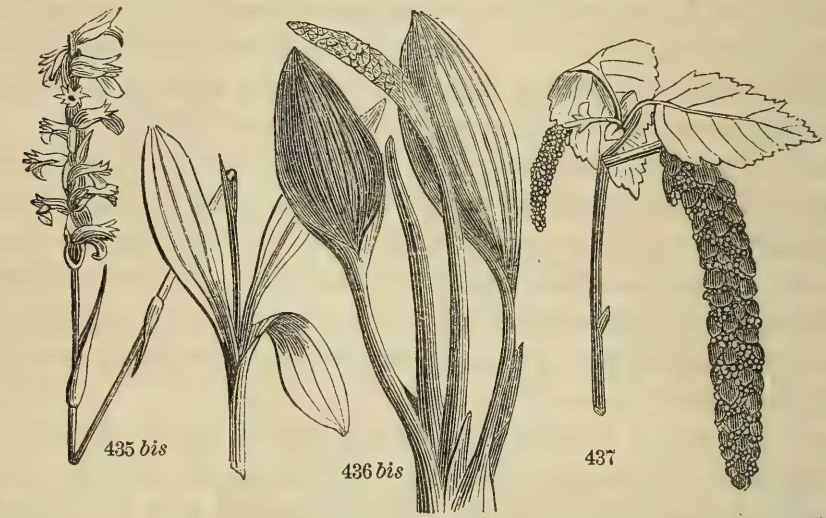
Review.—341. Define inflorescence. Metamorphosis of buds. 342. Position of buds. What may a single bud develop? 343. What is a peduncle? May it bear leaves? What the pedicels?—Rachis? When is a flower sessile? 344. How does a scape differ from peduncle? Where is the torus? 345. What are bracts?—Bractlets? How are the bracts in Crucifers? What of color? 346. Define spathe. Illustrate. 347. Define involucre—Involucel. 348. Describe a (so-called) compound flower. What is the chaff? 349. In Grasses, what are the glumes?—The pales? 350. What is the nature of the *cup* in Oak? Why is axillary infl. called indefinite?—Why centripetal? Why is terminal infl. definite?—Why centrifugal? How are both combined in Compositæ?

CHAPTER XXVI.

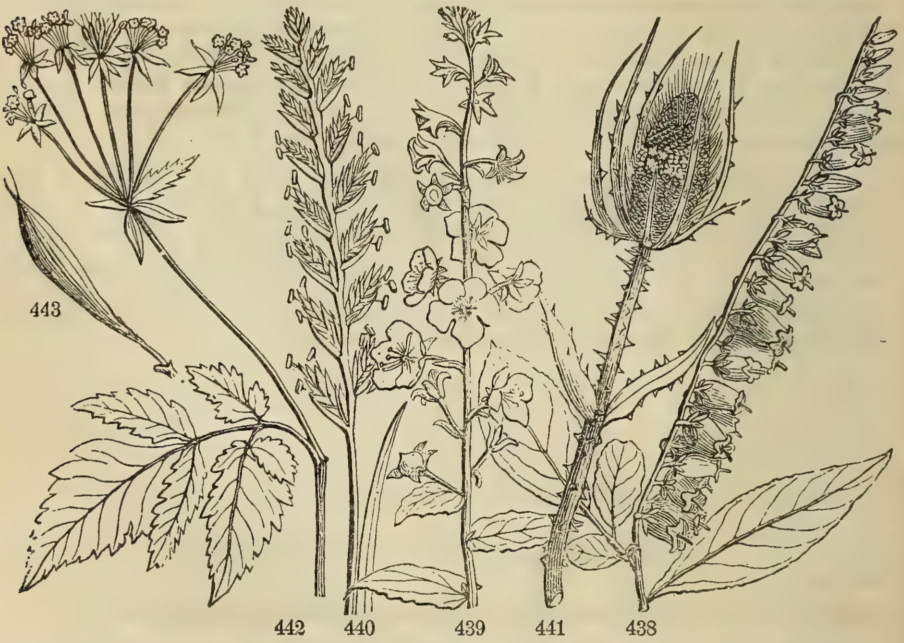
SPECIAL FORMS OF INFLORESCENCE.

355. **Of centripetal or axillary inflorescence** the principal varieties are the spike, spadix, catkin, raceme, corymb, umbel, panicle, thyrse, head. The *spike* is a long rachis with

sessile flowers either scattered, clustered, or crowded upon it, as Plantain, Mullein, Vervain. The so-called spikes of the Grasses, as Wheat, Timothy, are in fact *compound spikes*, bearing little spikes or *spikelets* in place of single flowers (440).



435, Spiranthes cernua—flowers in a twisted spike. 436, Orontium aquaticum—flowers on a naked spadix. 437, Betula lenta—flowers in aments.

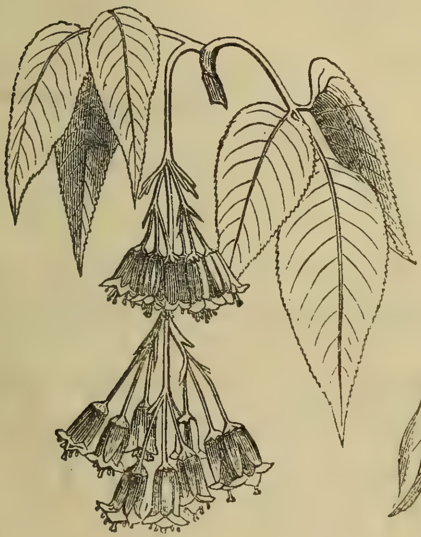


438, Andromeda racemosa—flowers in a secund raceme. 439, Verbascum Blattaria—raceme. 440, Lolium perenne—a compound spike or a spike of spikelets. 441, Dipsacus sylvestris—head with an involucre of leaves. 442, Osmorhiza longistylis—a compound umbel. 443, Its fruit.

356. The *spadix* is a thick, fleshy rachis, with flowers closely sessile or imbedded on it, and usually with a spathe, as in Calla (430), or without it, as in Golden-club (436).

357. The *catkin* or *ament* is a slender, pendent spike with scaly bracts subtending the naked, sessile flowers, all caducous (falling) together, as in Birch, Beech, Oak, Willow.

358. The *raceme* is a rachis bearing its flowers on distinct, simple pedicels. It may be erect, as in Hyacinth, Pyrola; or pendulous, as in Currant, Blackberry. The *corymb* differs from the raceme in having the lower pedicels lengthened so as to elevate all the flowers to about the same level. The corymb often becomes compound by the branching of its lower pedicels, as in Yarrow.



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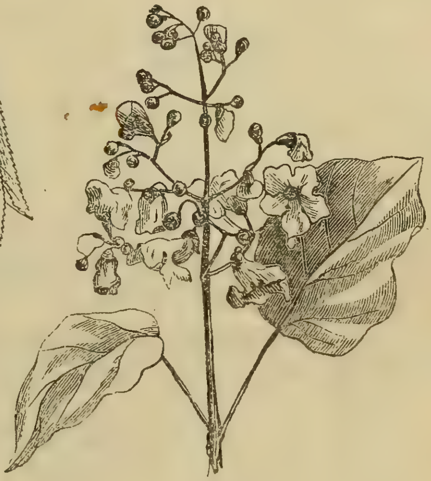

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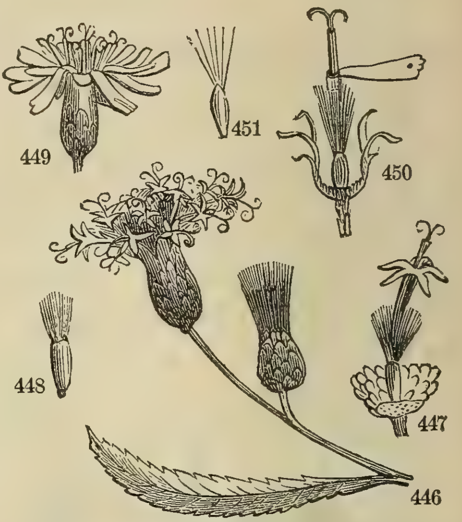
444, Staphylea trifolia—a pendulous, paniculate cyme. 445, Catalpa—a panicle.

359. An *umbel* consists of several pedicels of about equal length radiating from the same point—the top of the common peduncle, as Milk-weed, Ginseng, Onion. When the pedicels of an umbel become themselves umbels, as in Caraway and most of the Umbelliferæ, a *compound umbel* is produced. Such secondary umbels are called *umbellets*, and the primary pedicels, *rays*.

360. The *panicle* is a compound inflorescence formed by the irregular branching of the pedicels of the raceme, as in Oats,

Spear-grass, Catalpa. A *thyrse* is a sort of compact, oblong, or pyramidal panicle, as in Lilac, Grape.

361. A *head* or capitulum is a sort of reduced umbel, having the flowers all sessile upon the top of the peduncle, as in the Button-snake-root, Button-bush, Clover. But the more common examples of the capitulum are seen in the Compositæ, where the summit of the peduncle, that is, the receptacle, is dilated, bearing the sessile flowers above, and scale-like bracts around, as an involucre.



446, Vernonia fasciculata—flowers in a discoid head with an imbricated involucre. 447, A single flower remaining on the receptacle. 448, A fruit crowned with the pappus. 449, Mulgedium—a head. 450, A single flower remaining on the receptacle. 451, A fruit with pappus.

362. The *capitulum* of the Compositæ is often called a compound flower from its resemblance, the involucre answering to a calyx, the rays to the corolla. The flowers are called florets—those of the outer circle, *florets of the ray*, generally differing in form from those of the central portions, the *florets of the disk.*

363. **Of terminal inflorescence** the following varieties are described: cyme, fascicle (verticillaster), and glomerule.

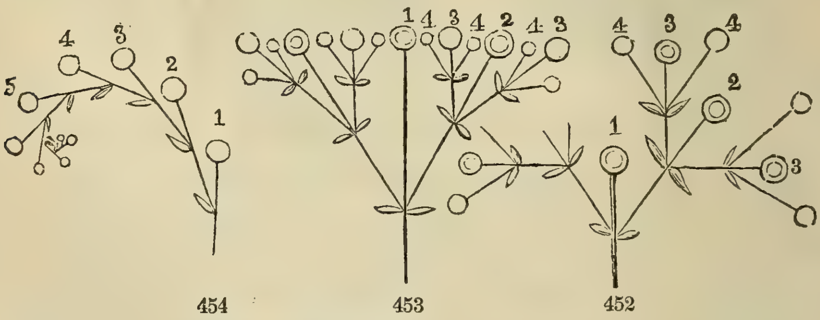
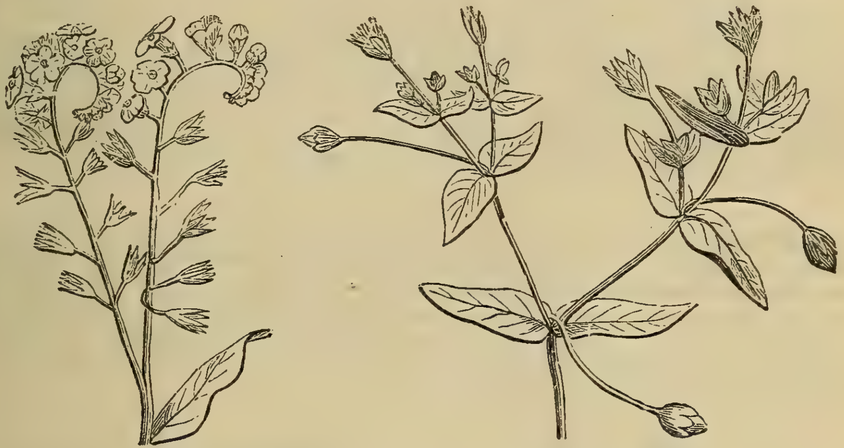


Diagram (452) of cyme; flowers numbered in the order of their development.—453, Cyme fastigiate. 454, Cyme half developed—a scorpoid raceme.

364. *Cyme* is a general term denoting any inflorescence with centrifugal evolutions, but is properly applied to that level-topped or fastigiate form which resembles the corymb, as in the

Elder. If it is loosely spreading, not fastigiate, it is called a *cymous panicle*, as in the Chickweed, Spergula, etc. If it be rounded, as in the Snowball, it is a *globous cyme.*

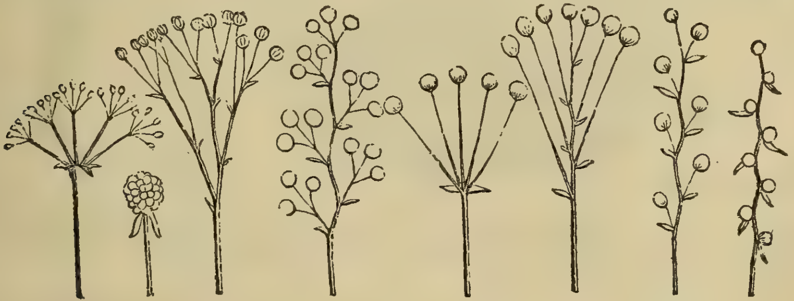


455 456

455, Myosotis palustris—scorpoid racemes. 456, Stellaria media—a regular cyme.

365. A *scorpoid cyme*, as seen in the Sundew, Sedum, and Borrage family, is a kind of coiled raceme, unrolling as it blossoms. It is understood to be a half-developed cyme, as illustrated in the cut (454). The *fascicle* is a modification of the cyme, with crowded and nearly sessile flowers, as in Sweet-William (Dianthus).

366. *Glomerule*, an axillary tufted cluster, with a centrifugal evolution, frequent in the Labiatæ, etc. When such occur in the axils of opposite leaves and meet around the stem, each pair constitutes a verticillaster or verticil, as in Catmint, Hoarhound.



463 464 462 461 460 459 458 457

367. The above diagrams show the mutual relations of the several forms of centripetal inflorescence—how they are graduated from the spike (457) to the head (464). Thus the spike (457) + the pedicels = raceme (458); the raceme with the lower pedicels length-

ened = corymb (459); the corymb − the rachis = umbel (460); the umbel − pedicels = head (464), etc.

(For the phenomena of Flowering, Coloring, the Floral Calendar, the Floral Clock, see the Class Book of Botany, pp. 75–77.)

Review.—355. Name the varieties of axillary inflorescence. What is the Spike? 356. What is the Spadix? 357. Compare the Ament and Spike. 358. Give examples of Racemes. Compare the Raceme and Corymb. How does the Corymb become compound? 359. How change Corymb to Umbel? What is the Compound Umbel? 360. Describe the Panicle—The Thyrse. 361. What is the Head? 362. Describe the Capitulum of Compositæ. What its involucre?—Its outer flowers?—Its inner flowers? 363. Name the varieties of Terminal Inflorescence. 364. Describe the Cyme. Show by fig. 456 how it is developed. 365. Nature of the scorpoid cyme. 366. What is the glomerule? 367. Show the relations of Spike to Raceme—Of Raceme to Corymb, etc. (457–464.)

⁂ Hitherto we have treated of the organisms of the Phænogamia, or Flowering Plants, the higher of the two Subkingdoms of the vegetable world. The other Subkingdom, called the Cryptogamia, or Flowerless Plants, includes the lower tribes of vegetation, such as the Ferns, Mosses, Lichens, etc., never adorned with flowers, and producing *spores* instead of seeds. For the Morphology of these tribes, see the Class Book of Botany, pp. 124–129. Or study carefully the descriptions at the head of the several Cryptogamic Orders in the present volume.

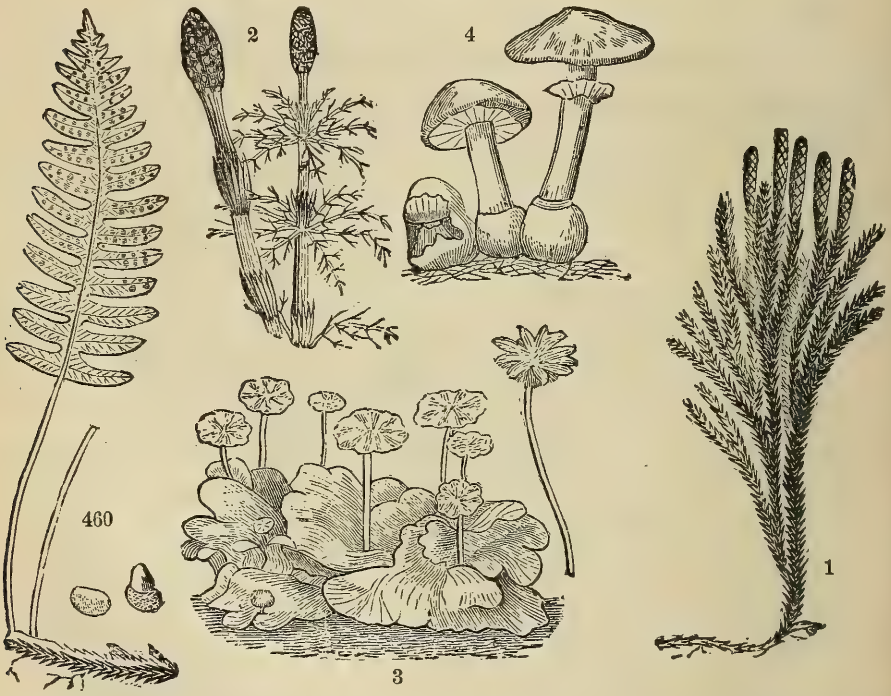


Fig. 460 *bis*, A Fern; Polypodium vulgare. 461 *bis*, Club-moss; Lycopodium dendroideum. 462 *bis*, Equisetum (Scouring Rush). 463 *bis*, a Liverwort Moss; Jungermannia. 464 *bis*, a Fungus or Mushroom; Agaricus, in three stages of growth.

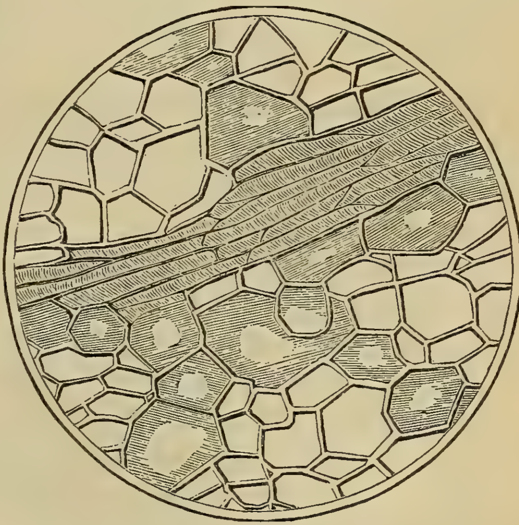
PART SECOND.

PHYSIOLOGICAL BOTANY.

CHAPTER I.

OF THE VEGETABLE CELL.

368. At the head of this chapter we place a sketch representing a thin cutting from the rhizome of Bloodroot, as seen under the microscope, magnified 100 diameters. It is all made up of cells, of various forms and colors, some green and red translucent, and others purely transparent. The microscope reveals a similar structure in all plants. In the pith of Elder, pulp of Snowberry, and especially in the pulp of Orange, we can discern the cells with the naked eye. Therefore—



465

465, Section of the rhizome of Bloodroot; *a*, *a*, a bundle of wood-cells. The shaded cells contain the color—*a*, green, *b*, red.

369. The *cell* is the elementary organism which by its repetitions makes up the mass of all vegetation. It is defined as a *closed sac composed of membrane containing a fluid.*

370. The primary form of the cell is spheroidal. In some cases it retains this form during its existence, but generally, in

growing, it takes new and various forms, which, on account of the two causes that control them, may be classed as *inherent* and *casual.* The inherent forms of the cell, or those depending on its own laws of growth, may be referred to three general types—(1) *spheroidal*, like Pollen grains, the red Snow-plant, the cells of leaf-tissue, etc., varying to oblong, or lobed, or stellate; (2) *cylindrical*, or tube-form, as most wood-cells are; (3) *tabular* or flattened, as the cells of the epidermis.

371. The casual forms result from external pressure—as of cells crowding against cells, in stems or pith. In this way spheroidal cells may become cubical, 8-sided, 12-sided, etc., tubiform cells, prismatic, and tabular cells 4-angled, hexagonal, etc.

372. In magnitude the plant-cell varies from $\frac{1}{100}$ to $\frac{1}{300}$ of an inch in diameter. The cells of Elder pith measure about $\frac{1}{200}$ inch; cells of parenchyma (leaf-tissue) about $\frac{1}{400}$; consequently, 64,000,000 of them would occupy only one cubic inch. The cells of cork are computed to be $\frac{1}{1000}$ inch in diameter—1000 millions to a cubic inch. But the length of some cells is more considerable. Wood-cells measure $\frac{1}{30}$ inch; bark-cells, as Flax, Hemp, nearly $\frac{1}{2}$ inch; the cells of some plant hairs, an inch or more.

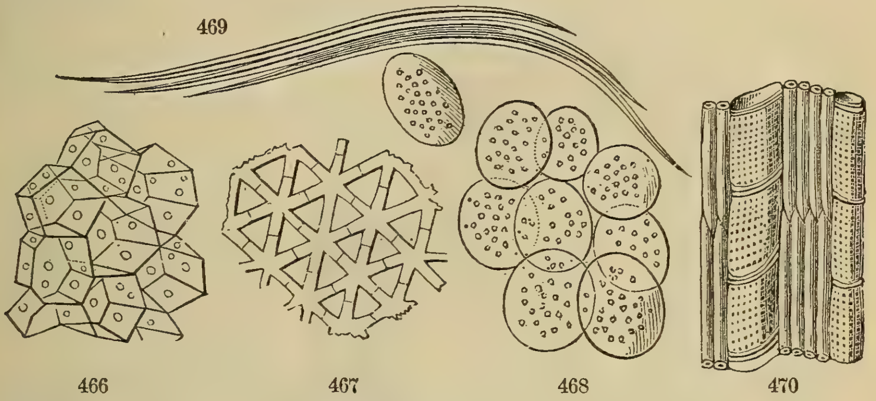
373. The wall of the new cell consists of two layers; the outer one a firm, colorless membrane, made of *cellulose*, the inner a plastic, gelatinous layer applied to the outer, and chiefly concerned in cell-life and multiplication. This is called the *primordial utricle.* It is best seen when treated with a weak solution of nitric acid, iodine, or alcohol. It thus becomes colored, contracts, and lies loose in the cell (472).

374. The cell-wall is easily permeated by fluids flowing in and out. It must, therefore, be regarded as porous; although it appears perfectly entire even under the highest magnifier.

375. A secondary layer is subsequently added to the outer layer, between it and the primordial utricle, as if to strengthen it. This new layer is seldom entire, but perforated and cleft in a great variety of patterns, leaving certain points or parts of the cell-wall still bare and discernible by their transparency. Hence the following varieties:

376. *Wood-cells*, which are finally filled up by the repetitions

of the secondary layers, leaving only minute points of the original cell-wall bare and transparent. A remarkable variety of the wood-cell is seen in the Pine and Coniferæ in general, where the points are large, transparent, and surrounded by two or three rings. These we call *Pitted cells.*



466, Polyhedral cells of parenchyma in pith of Elder. 467, Stellate cells in pith of Rush. 468, Spherical cells in Houseleek. 469, Wood-cells of the Flax fibre. 470, Cellular tissue of a young rootlet.

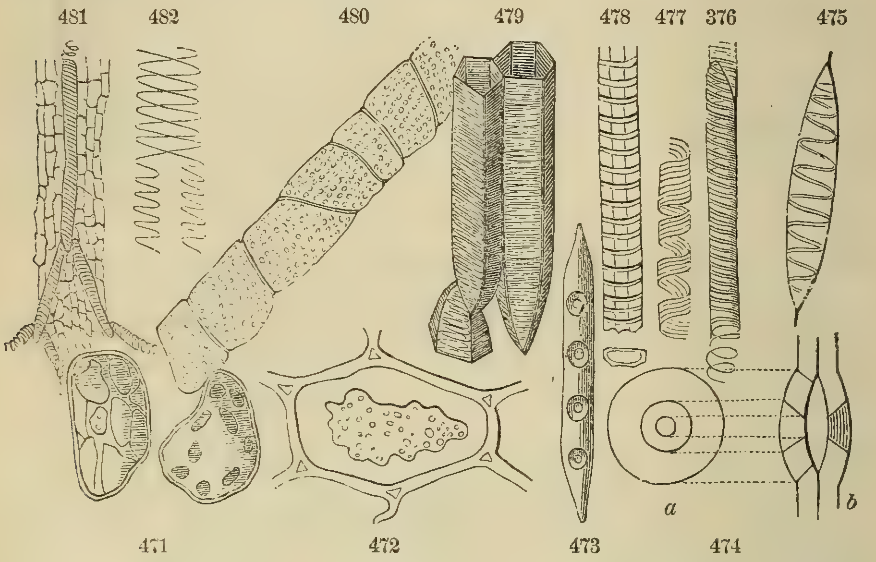
377. *Spiral cells*, where the secondary layer consists of spiral fibres or bands. There may be a single fibre, or several (2 to 20) united into a band. It is usually elastic, and may be drawn out and uncoiled. These beautiful cells may be well seen in a shoot of Elder, in the petiole of Rhubarb, Geranium, Strawberry. In the two latter, if gently pulled asunder, the coiled fibres appear to the naked eye.

378. *Annular cells*, when there are numerous rings within, instead of a spiral coil, as in the stems of Balsam and some Cryptogamia. *Scalariform cells*, when the rings seem conjoined by bars crossing between them, giving an appearance compared to a ladder (*scala*), as in the Vine and Ferns. *Porous* cells, with the secondary layers full of perforations; *reticulated* cells, as if a net-work; and many other forms.

379. *Cellulose*, the material of which the outer cell-walls and other secondary layers are made, is proved by chemical analysis to consist of three simple elements, carbon, hydrogen, oxygen, in the proportions of $C_{24} H_{20} O_{20}$—carbon and the exact elements of water. In the material of the primordial utricle nitrogen is added. Out of these four simple elements (C H O N), with slight additions of lime, silex, and a few other earthy mat-

ters, the Great Creator is able to produce all the countless varieties of plants which clothe and beautify the earth.

380. **Contents of the cell.** Some cells contain air only. Others are filled with solid matter; but the greater part contain both fluids and solids. There is the *cytoblast*, a globular atom, earnest of new cells; and *protoplasm*, the nourishing semi-fluid, both of the same material as the primordial utricle, and with it, and the fluid cell-sap, ever flowing, acting, combining, and producing either new cells or products like the following:



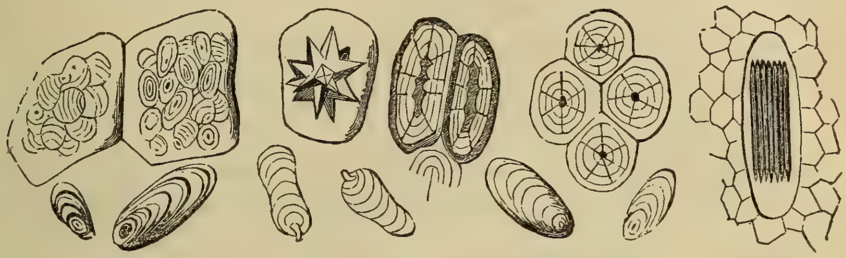
471, Cells—*a*, of the pulp of Snow-berry, showing the nucleus; *b*, of the parenchyma of the leaf of Pink, showing the granules of Chlorophylle. 472, Cell of a Cactus, soaked in Alcohol, the primordial utricle separated and contracted. 473, Cell of pleurenchyma of Pine, dotted. 474, Sketch to illustrate the nature of those dots—*a*, dot seen in front; *b*, a side view of the same. 475, Trachenchyma, a spiral cell from the sporange of Equisetum. 476, Spiral vessel of the Melon, single thread; 477, of the Elder, 4 threads. 478, Annular duct, distended by rings instead of a coil. 479, Scalariform vessels, from Osmunda (Fern). 480, A dotted duct from Gymnocladus (Coffee-tree). 481, Spiral vessels apparently branched. 482, Branching spirals in the Gourd.

381. *Chlorophyll*, the green coloring matter of leaves, consists of green corpuscles floating in the colorless sap or attached to the colorless wall. In the Indigo plant these corpuscles are blue, and constitute that poisonous drug. But the *coloring matter* which gives to fruits and flowers their bright and varying tints of yellow, red, and blue, is generally dissolved in the cell-sap, which is otherwise colorless.

382. *Starch* also originates here, in the form of little striated granules of the same composition as cellulose ($C_{24} H_{20} O_{20}$). Some twenty such granules appear in the same cell, either loosely or

compactly filling it. Starch is nutritive matter, sealed up for preservation and future use.

383. Gum, sugar, salts, acids, alkalies, poisons, medicines, whatever is peculiar in the properties of each vegetable substance, may also be held in solution in the cell-sap, and invisible, unless forming Raphides, little bundles of crystals, needle-shaped, or of some other form, seen in the cells of Rhubarb, Cactus, Hyacinth.



Contents of cells.—483. Cells of Potato containing starch-grains. 484, Starch-grains from the Potato; 485, from the E. Indian Arrowroot. 486, Raphides, acicular crystals, in a cell of Polyanthes tuberosa. 487, Crystals in a cell of Cactus. 488, Cells from the pulp of Pear, coated internally; a longitudinal section; 489, Transverse section. 490, Starch granules from W. Indian Arrowroot.

384. The *growth of the plant*, then, consists of the development of new cells. This is accomplished within the pre-existing cells, and by the agency of their contents. The primordial utricle divides itself into two or more utricles, by new walls growing from its sides until they meet. These then acquire the cellulose layer outside, the cytoblast inside, at the expense of the old cell, which shortly gives place to its new progeny. Thus cells multiply, and by millions on millions build up the fabric of the plant.

Review.—368. What composes all vegetable structures? 369. How is the cell defined? 370. What its primary form? Mention three varieties. 371. Whence the casual forms? What are they? 372. What of size? How many in a cubic inch? What of Flax cells? 373. Describe the cell-wall. How bring the primordial utricle to view (as in 472)? Is the wall porous? 375. What appearance of the third layer? 376. What fills up the wood-cells? How do pitted cells appear? 377. Describe the wonderful structure of spiral cells. Show them (475). 378. Show annular cells in 478, and where else?—Scalariform? 379. What the material of the outer wall? Its elements? Elements of the inner wall? What within the cell? 381. What the chlorophyl? Condition of the coloring matter? 382. Describe the starch granules. 383. The raphides. 384. How do plants grow?

CHAPTER II.

THE TISSUES.

385. **One-celled plants.** The cell, as heretofore described, is endowed with a life within itself. It can imbibe fluids, nourish itself, and reproduce others like itself. It may, therefore, and actually does in some cases, exist alone as a plant! Many species of the Confervoids and Diatomes are plants consisting

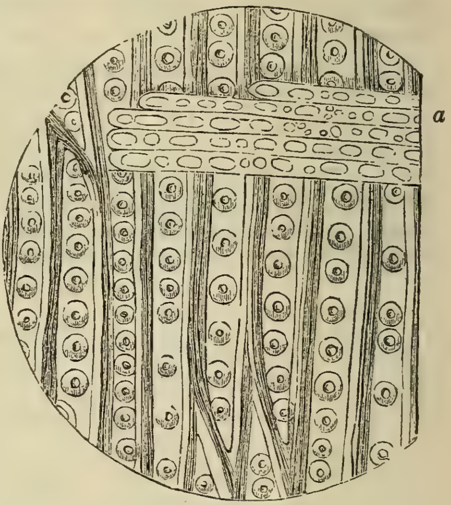
of a single cell—the simplest possible form of vegetation (see fig. 519).

386. With a few such exceptions, vegetation consists of a combination of cells united in a definite manner and form. Such combinations are called tissues, which we may describe under four general names or types:

I. CELLULAR TISSUE (PARENCHYMA):
II. FIBROUS TISSUE (PLEURENCHYMA):
III. VASCULAR TISSUE (TRACHENCHYMA):
IV. LATICIFEROUS TISSUE (CIENCHYMA).

387. **Parenchyma,** composed of spheroidal cells, is the most common form of tissue, no plant being without it, and many, especially of the lower orders, being entirely composed of it. Numerous varieties occur according to the forms of the cells and their closeness of contact, intermediate between the following:—1, when there are copious intercellular spaces, the cells slightly touching, and being (*a*) rounded, or (*b*) lobed, or (*c*) stellate; 2, when the cells are crowded, leaving no intercellular space, and being (*d*) prismatic, or (*e*) polyhedral, or (*f*) irregular.

388. Examples of these tissues are found (*a*) in the pulp of fruits, in newly-formed pith, and in all young growths; (*b*) in the lower stratum of leaf-tissue; (*c*) in the pith of rushes and other aquatic plants; (*d*) in the herbaceous stems of Monocotyledons; (*e*) everywhere, but well observed in full-formed pith; (*f*) abundant in all the soft, fleshy parts of plants.



491, Longitudinal section of Thuja (Red Cedar)—*a*, Medullary rays.

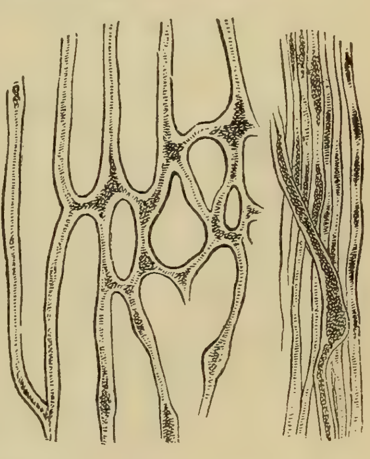
389. **Pleurenchyma** is composed of elongated cells cohering by their sides in such a way that end overreaches end, forming a continuous fibre. Two varieties are noticed—(*a*) wood-fibre, with cells of moderate length, remarkable for its firmness, the main constituent of the stems and trunks of the higher plants; (*b*) liber, with very long attenuated cells, the substance of the inner layers of bark, remarkable for its tenacity, especially in Flax, Hemp, Linden.

390. The *pitted cells* (§ 376) constitute a singular variety of wood-fibre, common in Pines, Firs, etc. That mysterious double ring which encircles each pit, is projected, the inner by the pit itself, which is an aperture in the secondary layer, the outer by a lens-shaped intercellular cavity opposite, outside (474).

391. **Trachenchyma** is a tissue of vessels or tubes rather than cells. The vessels are extended lengthwise, and composed each of a row of cells joined end to end, and fused into one by the absorption of the contiguous walls. This tissue varies according to the character of the constituent cells, which are (*a*) spiral, or (*b*) annular, or (*c*) scalariform, or (*d*) reticulated.

392. Such cells, with their tapering ends, form vessels with oblique joints. When porous cells with their truncated ends unite, they form right-jointed vessels resembling strings of beads, called dotted or vascular ducts. These are usually quite large, and characteristic of the woody layers of all Exogenous plants. The different varieties of trachenchyma are assigned to different regions and offices—(*a*) to the earliest formed part of the wood, the petioles and veins of leaves, petals of flowers, etc.; (*b*) to similar parts, but later formed, most abundant in Ferns and Equisetaceæ; (*c*) in the woody bundles of the Endogens, and in the succulent parts of plants in general; (*d*) most abundant in Ferns, Club-mosses.

393. **Cienchyma** is a system of milk-vessels—vessels secreting the latex or peculiar juice of the plant, white, yellow, red, turbid, containing opium, gamboge, caoutchouc, resin, etc. It occurs in the petioles and veins; in the parenchyma of roots, in the Liber especially; sometimes simple, generally branched and netted in a complicated manner, as well seen in the Poppy, Celandine, Bloodroot, Gum-elastic tree, etc.


492 493

Vessels of Cienchyma—492, from Dandelion; 493, from the Celandine.

394. These vessels are probably mere open spaces between the cells at first, subsequently acquiring a lining membrane which never exhibits pores or spiral markings. But there are also true *Intercellular passages* filled with air, and admitting its free circulation in all directions through the parenchyma. These are necessarily very irregular, and they communicate with the external air through the stomata (§ 397).

395. Thus the cell appears to be the type of every form of tissue, the material of which the vegetable fabric is built, and the laboratory where the work is performed.

Review.—385. What is the simplest form of vegetation? What constitutes a Tissue? Name the four tissues. 387. What the form of the cells of Parenchyma? Classify them. 389. What the form of the cells of Pleurenchyma? Two varieties? 390. In what trees do we find pitted cells? Show them. Explain fig. 474. 391. What is Trachenchyma? How are these tubes made? Show the structure of dotted ducts (480). 393. Office of Cienchyma? 394. Nature of these tubes? What of intercellular passages? 395. Give, finally, the import of the cell.

CHAPTER III.

THE EPIDERMAL SYSTEM

Includes the external covering of all herbaceous growths—viz., the epidermis, stomata, hairs, glands, cuticle, etc., organs which in older stems give place to bark.

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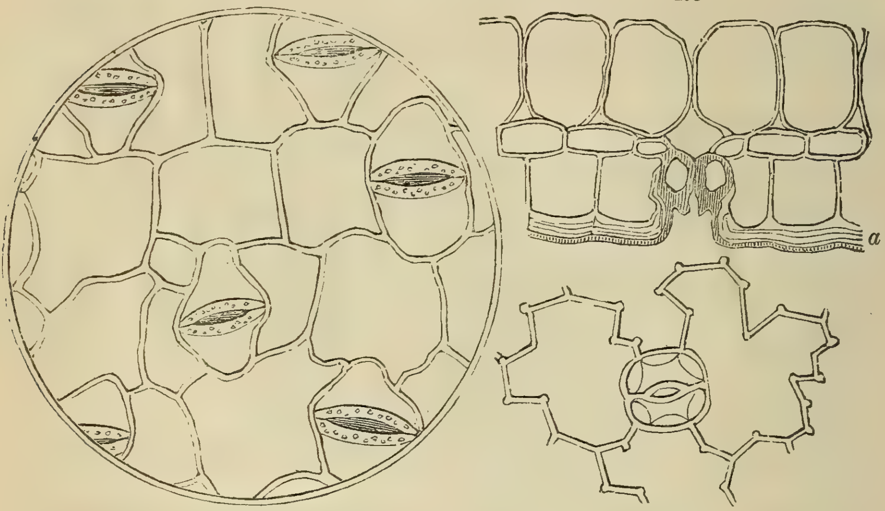

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494, Cells of epidermis with a stoma from leaf of Helleborus fœtidus. 495, Vertical section of a stoma of Narcissus—*a*, cuticle. 496, Epidermis cells with stomata of Tradescantia Virginica.

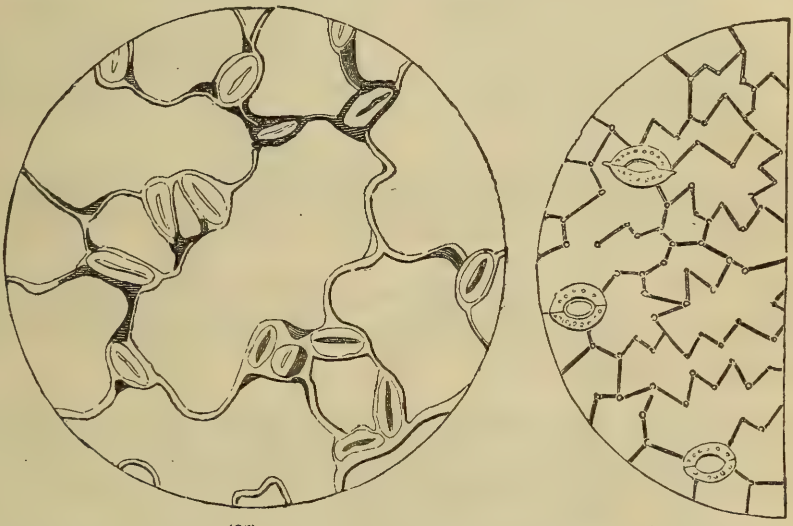
396. The epidermis (skin) consists of a layer of united, empty cells, mostly tabular, forming a superficial membrane. It invests all plants higher than Mosses, and all parts save the extremities, the stigma, and rootlets. Its office is to check evaporation. That delicate membrane which may be easily stripped off from the leaf of the Houseleek or the garden Iris is the epi-

dermis. It is transparent, colorless, and under the microscope reveals its cellular structure.

397. **Stomata.** The epidermis does not entirely exclude the tissues beneath it from the external air, but is cleft here and there by little chinks called stomata (mouths). Each stoma is guarded by a pair of reniform cells, of such mechanism (not well understood) as to open in a moist atmosphere and close in a dry.

398. The stomata are always placed over and communicate with the intercellular passages. They are found only on the green surfaces of parts exposed to the air, most abundant on the under surface of the leaves. Their numbers are immense. On the leaf of garden Rhubarb 5,000 were counted in the space of a square inch; in the garden Iris, 12,000; in the Pink, 36,000; in Hydrangea, 160,000.

399. The surface of the epidermis at length becomes itself coated with a delicate, transparent pellicle, not cellular, called the cuticle. It varies in consistency, being thicker and stronger in evergreen and succulent plants. It seems to be merely the outer cell-wall of the epidermis thickened and separated from the newly-formed wall beneath it.



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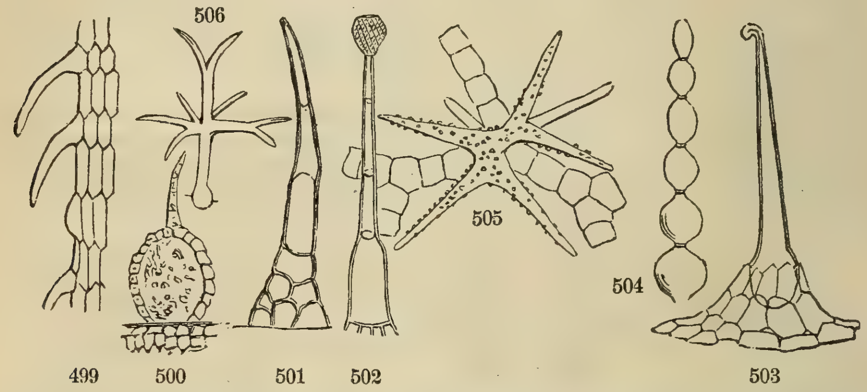
497, Cells and stomata of the epidermis of Oxalis violacea; and 498, of Convallaria racemosa.

400. The hairs which clothe the epidermis are mere expansions of its tissue. They may each consist of a single elongated cell, or of a row of cells. They may also be simple, or branched, or stellate, or otherwise diversified.

401. Glands are cellular structures serving to elaborate and contain the peculiar secretions of the plant, such as aromatic oils, resins, honey, poisons, etc. A gland may be merely an expanded cell at the summit of a hair, or at its base, and hence

called a glandular hair (Labiatæ). Or it may be a peculiar cell under the epidermis, giving to the organ a *punctate* appearance (leaf of Lemon). Other glands are compound, and either external (Sundew) or internal reservoirs of secretion (rind of Orange).

402. Stings are stiff-pointed, 1-celled hairs expanded at base into a gland containing poisonous secretion. An elastic ring of epidermal cells presses upon the gland so as to inject the poison into the wound made by its broken point (Nettle).



499, Rootlet of Madder, showing cells expanded into fibrillæ. 500, Glandular hair of Fraxinella, section. 501, Hair of Bryonia, of several cells. 502, Hair of several cells, surmounted by a gland, of Antirrhinum majus. 503, Sting of Urtica dioica. 504, Jointed hair of the stamens of Tradescantia. 505, Stellate hair from the petiole of Nuphar advena (magnified 200 diameters—Henfrey). 506, Branched hair, one cell, of Arabis.

403. Prickles are hardened hairs connected with the epidermis alone, thus differing from spines, which have a deeper origin. Examples in the Rose.

Review.—What does the Epidermal System include? 396. What is the office of the epidermis? What its cells? 397. What are the stomata? When are they open, and when closed? What of their numbers? Show them in the figures. 400. What the structure of hairs? 401. What the office of glands? What varieties? 402. Describe the mechanism of the sting (503). 403. Distinguish prickles from spines. Explain the cuts.

CHAPTER IV.

THE LIGNEOUS SYSTEM

Includes the firm structures of roots, stems, and their appendages, summarily called the *wood*.

404. There are four general modes of growth and structure,

whereby the vegetable kingdom is distinguished into as many great classes, viz.:

The outside-growers (Exogens),
The inside-growers (Endogens),
The point-growers (Acrogens),
The mass-growers (Thallogens).

405. **The exogenous structure.** A cross-section of the stem or branch of any dicotyledonous plant (Mustard, Maple) exhibits zones of different structures, which are distinguished as pith, medullary sheath, wood, and bark.

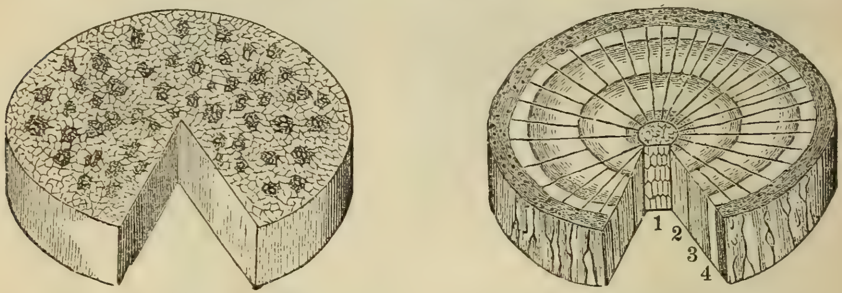
507, Exogens—Oak, Fir, etc. 508, Endogens—Palm, Agave, etc.

406. The *Pith* occupies the central part of the stem. It consists of parenchyma, is chiefly abundant in herbaceous plants and all young stems. When new, it is filled with fluids for the nourishment of the buds until they can make food for themselves. As the plant advances in age, the pith loses its vitality, is filled with air only, is often torn into cavities, or disappears.

407. The *Medullary sheath* immediately surrounds the pith. It is a thin, delicate tissue, consisting of spiral vessels. It communicates with every bud, and sends off detachments of its vessels to the petioles and veins of every leaf. Its tubes secrete oxygen from carbonic acid or water, and convey it to the leaves.

408. **The wood** consists of pleurenchyma and ducts (§ 392), arranged more or less distinctly in concentric zones or layers. The first, or inner layer, together with the medullary sheath and pith, is the product of the first year. One new layer is formed each successive year, during the life of the plant.

409. There are doubtless some exceptions to this rule. In tropical countries, where there is no distinction of seasons, there may be several zones deposited annually; or, on the other hand, several or all the annual layers may be so blended by the uniform mixture of the ducts with the wood-tissue as to be undistinguishable. The layers of the beet-root are certainly not annual. They seem to correspond with the number of leaf-cycles (§ 263).



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509

509, Cross-sections of an exogenous stem (Elm) of two years' growth—1, pith; 2, 3, annual layers of wood, next the cambium; 4, bark;—510, an Endogenous stem (Sorghum, or Millet) where there is no distinction of layers.

410. The *Alburnum* and *Duramen*—the sap-wood and heartwood—are well-known distinctions in the wood. The former, named from *albus*, white, is usually of a light color and softer structure. It is the living part of the wood, through whose vessels mainly the sap ascends. The interior layers of the alburnum gradually harden by the deposition of solid matter in their vessels, and the thickening of the cell-walls, until fluids can no longer pass through them. Thus the *duramen* (*durus*, hard) is formed of a firm and durable texture—the only part valued as timber. Its varying colors in Cherry, Walnut, Rosewood, are well known. It is of no account in vegetation, and may be considered as *dead*. Hence it often decays, leaving the trunk hollow, and the tree at the same time as flourishing as ever.

411. **The bark** succeeds and replaces the epidermis, covering and protecting the wood. It is readily distinguished into three parts, viz.:

The inner, white bark (liber);
The middle, green bark (cellular);
The outer, brown bark (cortical).

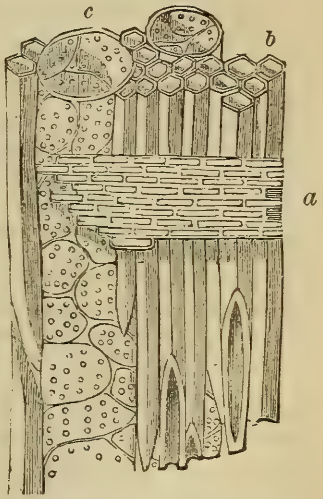
The substance of all these is parenchyma; and arranged, like the wood, in layers.

412. The *liber*, or white bark, contains scattered bundles of pleurenchyma and cienchyma with its cellular tissue. Its wood-cells are very long (§ 389), called bast-cells, and are strengthened with secondary deposits until quite filled up. Hence the strength and toughness of flax and hemp. The strong material of "Russian matting" is from the liber of the Linden-tree, and the "lace" of the South Seas, from the Lace-bark tree. The liber of other trees is not remarkable for strength.

413. The *cellular*, or *green bark*, succeeds to the liber. Its tissue resembles that of the leaf—being filled with sap and chlorophyl. It grows laterally, to accommodate itself to the enlarging circumference of the tree, but does not increase in thickness after the first few years.

414. The *cortical*, or brown bark. Its color is not always brown, being rarely white (Canoe Birch), or straw-color (Yellow Birch), or greenish (Striped Maple), or grayish (Beech, Magnolia). Its substance is always cellular tissue, but differing widely in consistency in different species. Its new layers come from within, formed from the green bark, while its older are sooner or later cast off.

511



511, Wood of Oak—section longitudinal, showing, *a*, medullary rays; *b*, wood-cells; *c*, porous ducts.

415. The cortical layers sometimes accumulate to a considerable thickness (Maple, Hickory, Oak), but are finally rent and furrowed by the expanding wood. In the Cork Oak (Quercus suber) they attain an excessive growth, furnishing that useful substance, *cork*. In Birch (Betula papyracea) these layers resemble paper, long abiding by their elasticity the expansion of the trunk.

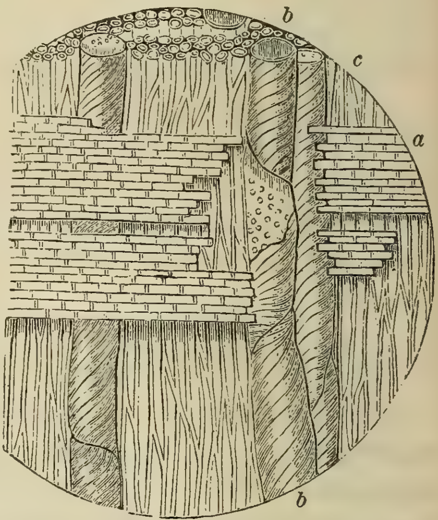
416. **The medullary rays** (*medulla*, pith) are those fine

lines which appear in a cross-section, passing like radii from the pith to the bark, intersecting the wood and dividing it into wedge-shaped bundles or sectors. They consist of firm plates of parenchyma (muriform tissue, the cell resembling brick-work) belonging to the same system with the pith.

417. The medullary rays are no less frequent in the outer layer of wood than in the inner. Hence, their number must increase yearly, and a new set commence with each successive layer, extending with those already formed through the subsequent layers to the bark, as shown in the diagram (509). In a radial section (511, 512) the medullary rays are more conspicuous as shining plates of a satin-like texture, called the *silver-grain*, quite showy in Oak, Maple. A tangential section shows their ends in the form of thin ellipses. They serve as *bonds* to combine into one firm body the successive wood-layers, and as channels of communication to and from the bark and heart-wood. They also generate, at their outer extremities, the adventitious buds.

418. **The cambium layer.** Between the liber and the wood there is formed in the Spring, at the time of the opening of the buds, a mucilaginous, half-organized layer of matter. Its presence loosens the bark, and renders it easily peeled from the wood. The cambium is a sap solution of the starchy deposits of the preceding year, now being rapidly organized into cells.

419. This is the *generative layer*, whence spring all the growths of the ligneous system. From this, during each growing season, two layers are developed, one of liber and one of wood, both at first a cellular mass, but the cells with wonderful precision transforming, some into the slender bast-cells of the liber, some into the dotted ducts and fusiform cells of the wood, some into the muriform tissue of the medullary rays. Through these latter the quickening influence of the cambium pervades both wood and bark.



512, Wood of Maple—*a*, medullary rays; *b*, ducts; *c*, wood-cells.

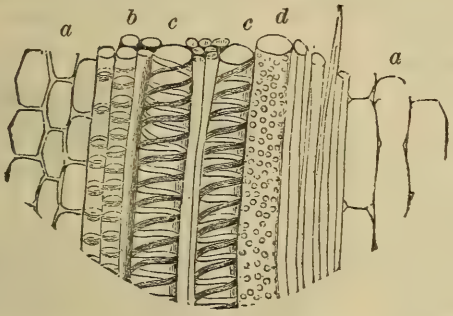
420. Unlimited growth is therefore a characteristic of the exogenous stem ; for the yearly increments are added to the *outside* of the wood, and the bark is capable of expansion by lateral growth to any extent.

Review.—What does the "Ligneous System" include? 404. Name the four grand divisions of plants. 405. Describe a cross-section of Exogen. 406. The pith—its composition and contents. 407. The medullary sheath—its composition, connections, office. 408. Of what does the wood consist? How much grew the first year?—Each successive year? The rule? 409. Exceptions? 410. What is the alburnum? How does it become duramen? Which is valuable as timber? What has perished in a hollow tree? 411. Name the three layers of the bark. 412. Tissues of liber? Why so tough? 413. Tissue of the green bark? 414. Tissue of the brown bark? Its varying colors? 415. How is it in Cork Oak? 416. What the medullary rays?—Their structure?—Tissue? Show the "silver-grain" in fig. 509. What their service? 418. Where the cambium layer? What is it? 419. Why called the generative layer? 420. Why is the growth of Exogens unlimited?

CHAPTER V.

THE LIGNEOUS SYSTEM—CONTINUED.

421. **The endogenous structure.** In the cross-section of a monocotyledonous stem (Corn, Palm) there is no visible distinction of bark, wood, pith, or of annual layers of any kind. It is composed of tissues quite similar to those of the exogenous stem, but very differently arranged.



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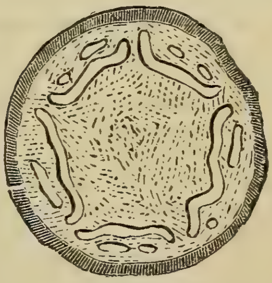


514

513, Various kinds of vessels in a wood-fibre of Bamboo or Rattan—*a*, Cells of parenchyma; *b*, annular cells; *c*, spiral vessels; *d*, porous duct; *e*, wood-cells. 514, Section of an Acrogenous stem of Tree-Fern (Cyathea), showing the vascular bundles imbedded near the circumference of the cellular mass.

422. The body of the *monocotyledonous* stem consists of parenchyma, within which tissue numerous threadlike bundles of woody matter are imbedded. Each bundle consists of one or more dotted ducts accompanied by spiral vessels, pleurenchyma, and often cienchyma, variously arranged in different species.

423. The formation of these bundles is dependent upon the leaves, from which they may severally be traced downward, first tending toward the interior of the stem. Further on they recurve outward again, and finally terminate near the surface, there interlacing and combining with their fellows, and forming an excessively hard but inseparable rind (false bark). From this entanglement of the fibres the cleavage of endogenous stems is difficult or impossible. In jointed stems (culms) this entanglement occurs only at the nodes (Cane, Grasses).

424. The growth of monocotyledonous stems thus takes place by the addition of the new wood bundles to the interior, and hence such plants are called *Inside-growers* or ENDOGENS.

The caudex of Endogens often takes peculiar forms. The rind is capable of only a limited expansion. This limit is soonest attained at the base of the stem, long before the upper parts cease to enlarge. Consequently such trunks are often seen of equal or greater diameter at the summit than at the base: so the Palmetto, Corn, Bamboo.

425. **The acrogenous structure** is found in Mosses, Ferns, and the other higher tribes of the Cryptogamia. The stems advance, beneath or above the ground, full-formed, growing only at the end, hence called *Acrogens.*

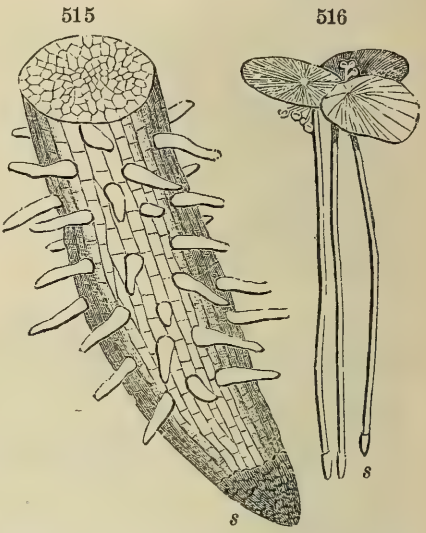
A cross-section of a Fern stem shows a body of parenchyma strengthened by an outer zone of fibro-vascular bundles, the whole invested with a sort of bark. The bundles are precisely similar to those found in the petioles, showing that the stem is the aggregate of the unaltered leaf-bases (514).

426. **Thallogens** are the lowest in the scale of rank, having no true axis and no other tissue than parenchyma, which grows in threads or in mass in all directions. The apparent stems (the *stipes*), if there be any, support the fructification only. Such are Sea-weeds, Lichens, Mushrooms, Puff-balls, Frog-spittle, and Mildew.

427. **The structure of roots** presents few deviations from that of the stems to which they severally belong, being exogenous in Exogens, endogenous in Endogens, etc. In the former class the central pith disappears, its place being occupied mainly by vascular ducts; and the liber, if any, has no bast-cells.

428. The FIBRILLÆ and pileorhiza should, however, be mentioned as peculiar in the structure of the root. The former are produced by millions, clothing the delicate epidermis of the young rootlets as with a cottony down, especially in light soils. They usually consist of a single cell of the epidermis extended, as seen in figure 515. They are the true absorbents, the *mouths* of the growing plant.

429. The microscope shows that the extreme, advancing point of the delicate, growing fibres is not thrust naked against the opposing soil, but is covered with a cap called PILEORHIZA (*pileus*, a cap, *rhiza*, root), which consists of older, hardened cells, behind which are formed the new cells. In the Duckmeat, the pileorhiza is lengthened into a sheath.



515, Extremity of the rootlet of Maple, with fibrillæ and (*s*) pileorhiza. 516, Two plants of Lemna minor (Duckmeat)—*s*, their pileorhiza.

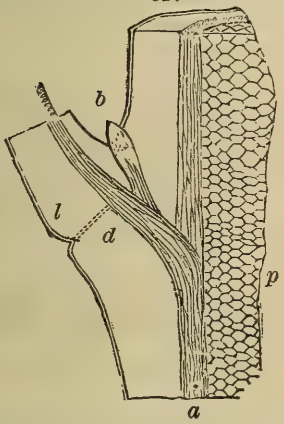
430. The manner of growth in the root is not like that of stems, by the extension of parts already formed, but simply by the addition of new matter at the advancing point. This accounts for the wonderful facility with which it penetrates the soil and finds its way uninjured into the hardest earth.

431. **Structure of Leaves.** The leaf may be regarded as an expansion of the two outer integuments of the bark, or of the green bark and the epidermis, expanded into a broad, thin surface by a woody framework proceeding from the medullary sheath and the liber. The framework of veins is therefore fibro

vascular, abounding in spiral vessels, and strengthened with liber.

432. The parenchyma exists in two strata, more or less distinct. In all those leaves which are ordinarily horizontal in position, one surface being upward and the other downward, these two layers are dissimilar; but in leaves with a vertical lamina (Iris), and in Phyllodia (§ 321), the two layers are similar.

517



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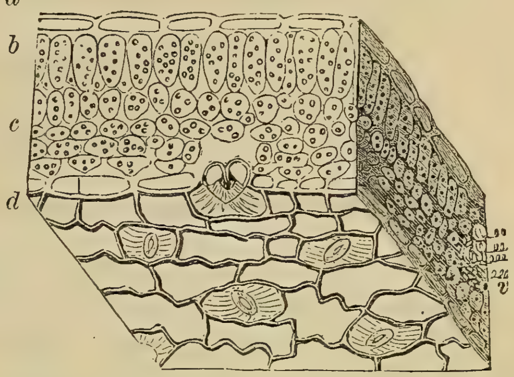


517, Section of a stem at the origin of a leaf—*p*, cellular, or pith; *a*, vascular, the medullary sheath sending off a bundle into the leaf-stalk; *d*, the swelling (pulvinus) just below the articulation of the leaf-stalk (*l*); *b*, the axillary bud. 518, Minute portion of a leaf of Viola tricolor, viewed in perspective, showing, *a*, cells of epidermis above; *b*, compact parenchyma of the upper portion of the leaf; *c*, loose parenchyma; *d*, epidermal-cells of the lower surface with stomata, one cut and opening into the intercellular passages. (Magnified 100 diameters.)

433. Our cut (518) displays a superficial layer of the empty tabular cells (*a*) of the epidermis. Next beneath, in the surface on which the sun shines, are one or two layers of oblong cells (*b*) placed perpendicularly to that surface, and more compact than the cells beneath them (*c*), which are pervaded by intercellular passages and by the veins.

434. The stomata as a rule belong to the *shaded* side of the leaf, avoiding the sun's direct rays. On the sunny side there are few, comparatively, or none. In the submerged leaves of water-plants, the epidermal layer is hardly distinguishable, and is wholly destitute of stomata. In such leaves as float upon water (Water Lilies) stomata are found in the upper surface alone.

435. Within all the vesicles of the parenchyma are seen adhering to the walls the green globules of *chlorophyl*, which give color to the leaf—dark green above, where it is more compact; paler beneath, where the cells are more loose and separate.

Vessels of *cienchyma* pervade the under-layer of parenchyma, returning the elaborated juices through the petiole into the cambium layer.

Review.—421. Note a cross-section of Endogen. Its structure. 422. Constituents of a wood-bundle—(explain 511). 423. Trace its course. Has the Endogen a true bark? Why so difficult to split? 424. Show the significance of the term *Endogen.* Also of the term *Exogen.* Why the caudex is smallest at base. 425. What tribes are *Acrogens?* Significance of the term. Carefully describe a cross-section (514). 426. What is the rank of the *Thallogens?*—Significance of the term?—Their only tissue? What semblance of stems have they? 428. Fibrillæ of the Root. Show them. 429. Pileorhiza. Show it. 430. How the root grows and penetrates the soil. 431. Origin of the leaf. Substance of the veins. 432. The parenchyma. When are its two strata alike? 434. Place of the stomata? Exceptions. 435. Condition of the chlorophyl. The cienchyma, where and why?

CHAPTER VI.

VEGETATION, OR THE PHYSIOLOGY OF PLANT LIFE.

436. We have now briefly surveyed the mechanism of the plant—both its outward forms and internal structure. We next inquire into the uses of all this wonderful apparatus; what the specific office which each part performs in the economy of the plant; and how all parts co-operate in the work of living and growing.

437. *What is life?* This inquiry meets us at the beginning—a problem never solved. The spontaneous action of the plant, the self-determined shapes which it assumes, we at once refer to this principle—its vitality; but of the nature of this principle itself, we can only say—Is it not a direct emanation from the Supreme Will, the Fountain of all life?

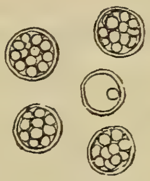
438. Vegetation is doubtless the lowest form of life. It springs directly from inorganic or mineral matter, and is the first step in the organization of mineral matter. Its material is, therefore, *mineral* matter rendered *organic* through the vital force. The subordination of the vegetable to the animal kingdom is thus manifest in its being fed and nourished on inorganic matter. It is interposed between these two incompatible extremes, and is ordained to transform the innutritious mineral into the proper and indispensable food of the animal kingdom.

439. *The process of vegetation* consists of imbibing the crude matters of the earth and air, transforming into sap, assimilating

to plant-juice (latex), and organizing into its own structure according to its own plan. The vital phenomena on which these transformations depend are called absorption, circulation, exhalation, assimilation, secretion, all of which processes take place in the individual cell. Cell-life, therefore, is an epitome of the life of the whole plant. The cell is never a spontaneous production; it is the offspring of a pre-existing cell. So with the plant; it is always the offspring of a pre-existing embryo or cell. Nothing but a cell can produce or nourish a cell.

440. Two kinds of organic matter make up the cell. The first, protoplasm, or protein ($C_{40}\ H_{31}\ O_{12}\ N_5$), the material of the primordial utricle (§ 373), etc., containing nitrogen; 2d, cellulose ($C_{12}\ H_{10}\ O_{10}$), the material of the outer wall or crust, etc., containing no nitrogen. The former more nearly resembles animal matter, and is the seat of the vital force and chemical action.

441. Through the invisible pores of its walls the cell imbibes the fluid in which its food is dissolved, viz., sugar or dextrine, ammonia or some other nitrogenous substance. Such a fluid may be the flowing sap of the plant, or any similar artificial mixture in which the cell is bathed, as (in the case of the Yeast-plant) a syrup with mucilage.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519, Protococcus viridis—the Green Snow-plant.
520, Penicillum glaucum—the Yeast-plant.

442. The sugar is thus brought into contact with the protoplasm in the cell, through whose action it is decomposed, and its elements transformed into cellulose and water. Thus each atom of (grape) sugar or dextrine becomes

$$\begin{array}{ll} \text{One atom of cellulose,} & C_{12}\ H_{10}\ O_{10} \\ \text{and two atoms of water,} & \underline{\quad\ H_2\ O_2\quad} \\ & C_{12}\ H_{12}\ O_{12} = \text{grape sugar.} \end{array}$$

The water is exhaled with the rest; the cellulose is retained to incrust a new cell as soon as the primordial utricle shall next divide itself to form one. Or it may be deposited as starch granules for future use.

443. In the cells of green plants the globules of chlorophyl

act an important part. Their formation depends upon the decomposition of carbonic acid (CO_2), the retention of the carbon, and the exhalation of the oxygen under the stimulus of the light. If the formation of cellulose continue beyond the present need for cell formation, the excess is deposited in the form of starch granules enclosed within the globules of chlorophyl, one in each.

444. When the starch granules are redissolved, they go to incrust the next new cell, or to form a secondary layer in the old cell; or in Autumn they go out into the general circulation, and are at length stored up in the buds, the cambium, the roots, ready for an early use the following Spring.

445. The increase of the protoplasm from the decomposition of the ammonia or other nitrogenous compounds present, is a more intricate process, but no less evident; and when in excess, this also is deposited in minute globules of gluten, mucus, legumine, chiefly in seeds (Wheat, Beans, Rice), in aid of germination.

446. The starch and gluten deposits of the Wheat-kernel are about sixty-eight and seventeen per cent. The former is found in the interior cells, the latter in the exterior, adjoining the pericarp or bran. In "flouring," some of the gluten adheres to the bran, and some constitutes the coarser meal, all of which is separated by the "bolt." Extra flour must, therefore, necessarily be deficient in gluten, the only element of the Wheat which adapts it to the formation of muscle—a great error.

Review.—436. What inquiries next arise? 437. A problem unsolved. What the phenomena of plant life? 438. What the lowest form of life? Whence does it spring? Why subordinate? 439. The process of vegetation. The five vital phenomena. 440. Two kinds of organic matter. Write out their symbols. Which resembles animal matter? 441. What the cell imbibes. From what fluid? 442. The chemical decomposition—Express it. What becomes of the cellulose thus formed? 443. Chlorophyl how formed? What globule within a globule? 445. What becomes of the excess of protoplasm? 446. What per cent. of starch and gluten in Wheat? Why is *extra flour* deficient in gluten?

CHAPTER VII.

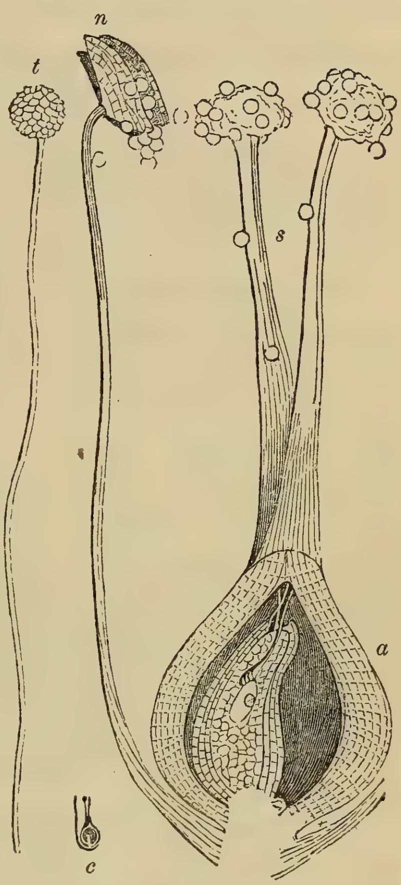
FERTILIZATION.

447. Such being the vital energy of the cell, it is easy to admit the possibility of either its solitary existence as a plant (Protococcus, etc.), or of its associated existence, as in the living tissue of most plants. Now all plants, without exception, do actually commence existence in the state of a simple cell. But while in the lower plants (Cryptogamia) this simple cell, the plant rudiment, is at once discharged, free and independent, to float or grow, in the Phenogamia it is yet a while protected and nourished by other cells—the cells of the ovule.

448. This primitive cell-plant, after acquiring the requisite means, swells and divides itself into two or more new cells. If

these new cells cohere into a tissue assuming a definite form, as in the higher plants, the process is called *growth;* but if they separate, each one still abiding separate, it is *reproduction.*

449. **The embryonic vesicle** is the expressive name of the embryonic cell of the Flowering Plants. It has its birth in that large cell of the nucleus of the ovule (§ 142) called the embryo sac, and is in some way developed from the cytoblast (§ 380). In appearance it may be like other new cells; but in the impulse or instinct with which it is endowed, it is immeasurably different. It looks not to the mere continuation of an old series, but is the projector and pioneer of a new. But before it can enter upon its course of development so different from the destination of common cells, it must somehow be quickened and energized with an impulse in this new direction. In other words, it must be fertilized—a process dependent on the pollen-grains (§ 121).



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521, Section of the ovary of Polygonum Pennsylvanicum, in process of fertilization. (Magnified 20 diameters.) *c*, Natural size; *n*, one of the stamens, having discharged its pollen; *t*, a grain of pollen and its tube; *s*, styles and stigmas; *o*, ovary, ovule, embryo sac containing the embryonic globule. The extremity of a pollen-tube is seen in contact with the embryo sac.

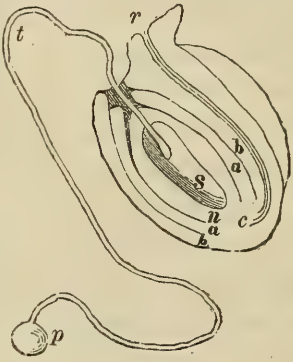
450. The annexed cut indicates all that is certainly known of this recondite process. The pollen-grain falls upon the stigma, imbibes the saccharine moisture there, and its inner coat of protoplasm expands and protrudes through the aperture (one or more) of the outer crustaceous coat, in the form of an attenuated tube. This, like a radicle, sinks into the soft tissues of the stigma and style, reaches the ovary, enters the micropyle of the ovule, makes its way to the nucleus, and penetrates *to the embryo sac.* Here its growth ceases, and its contents pass by absorption into the sac.

451. This is the view of Mohl, Henfrey, and of botanists generally. But Schleiden maintains that the end of the pollen-tube actually penetrates the sac, and itself becomes the embryonic cell. The pollen-grain is in this view the primitive cell, and is itself quickened into development by the contents of the embryo sac (522).

452. However this may be, the embryonic globule, thus some-

how endowed with a new instinct, immediately becomes a new centre of growth. First it expands to a proper cell, attached to the wall of the sac near the micropyle. It then, by division and subdivision, multiplies itself, and begins to take form according to the species, showing cotyledon, plumule, etc., until fully developed into the embryo (523).

453. In the case of the CONIFERS (Pines, Cedars, Firs), where no styles or stigmas exist, the pollen falls directly into the micropyle of the naked ovule, and its tubes settle into the tissue of the nucleus.



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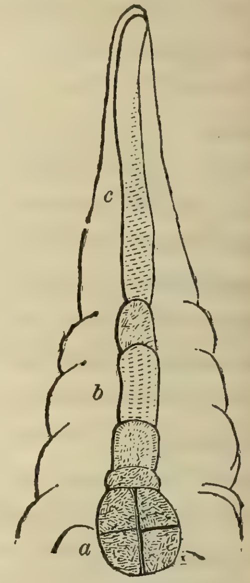

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522. Ovule of Viola tricolor, showing the process of fertilization according to the views of Schleiden—*p*, pollen; *t*, tube; *r*, raphe; *c*, chalaza; *b*, primine; *a*, secundine; *n*, nucleus; *s*, sac, which the tube appears to have penetrated. 523, Growth of the embryo in Hippuris vulgaris. The fertilized cell has divided itself into several, of which *c*, *b* constitute the suspensor attached to the apex of the sac; *a*, embryo dividing into 2, then into 4 cells.

454. **Germination.** The ovule matures with the completion of the embryo, and passes into the fixed state of the seed in which the embryo sleeps. A store of nutritive matter, starch, gluten, etc., is thoughtfully provided in the seed for the use of the young plant in germination, until its root has gained fast hold of the soil.

455. The changes which occur in the seed at the recommencement of growth, are simply such as are requisite to reduce its dry insoluble deposits to a solution which shall contain the proper materials for cell-formation or growth. Gluten and other nitrogenous matters, oil, starch, etc., are to be changed to *diastase*, the same as yeast; and *dextrine*, the same as gum and grape sugar.

456. To this end water and oxygen are absorbed; the gluten begins decomposition, forming yeast; fermentation ensues; heat is produced by the slow combustion of the carbon with oxygen, forming and evolving carbonic acid, by which process some of the oil and starch is destroyed, while another portion gains water and turns to sugar;—all this within the cells of the seed.

457. **Ripening of Fruits.** After the fruit has attained its full growth the process of ripening commences, during which the pulp becomes gradually sweetened and softened, chiefly by the change of the starch into more or less of soluble sugar. Thus ripening is to the pericarp what germination is to the seed. In its earliest stage the pericarp consists of structure similar to that of green leaves, composed of cellular, vascular, and woody tissues, and epidermis with stomata. Its distended growth afterward results from the accumulation of the flowing sap, which here finds an axis incapable of extension. Thus arrested in its progress it gorges the pistil and adjacent parts, is condensed by exhalation, assimilated by their green tissues, which still perform the office of leaves. Cell-formation goes on rapidly within, and the excess of cellulose is deposited in the cells as starch. Oxygen is usually absorbed in excess, acidifying the juices.

458. In the same way we account for the production of *honey* in the flower. Copious deposits of starch are provided in the receptacle and disk (§ 85). At the opening of the flower, this is changed to sugar, to aid in the rapid development of those delicate organs which have no chlorophyl wherewith to assimilate their own food. The excess of sugar flows over in the form of honey. The wise economy of the honey is seen in fertilization. For, attracted by it, the insect enters the flower, rudely brushes the pollen from the now open anthers, and inevitably lodges some of its thousand grains upon the stigma!

459. Experiment has proved that in all these cases of the formation of sugar from starch oxygen is absorbed and carbonic acid evolved—a process which we might expect, since starch ($C_{12} H_{10} O_{10}$) contains proportionably more carbon than sugar ($C_{12} H_{12} O_{12}$) contains. It is probable that these two phenomena in vegetation are always co-existent.

Review.—447. May a plant consist of a single cell? An example. Two modes of development. 448. How is *growth* distinguished from *reproduction?* 449. What is the embryonic vesicle?—Its origin?—Its destination? Whence this new impulse? 450. Trace the growth of the pollen-grain. Trace the course of its tube. 451. Different views of this. Show by the figures. 452. Development after fertilization. 453. Course of the pollen in the Conifers. 454. State of the embryo in the seed. Provision for its nourishment. 455. What chemical changes ensue? Whence the yeast?—The sugar?—The heat? 456. What is formed in ripening fruits? 458. Whence is honey?—Its economy?

CHAPTER VIII.

ABSORPTION.

460. **Office of the root.** The absorption of liquids, containing in solution the food of the plant, is the peculiar and indispensable office of the root.

Take a small growing plant from the earth and immerse it by its roots, which should be nearly or quite entire, in a cup containing a definite quantity of water. Place near it another cup with a like quantity of water to indicate the amount of evaporation. The difference of the diminution in the two cups will be the amount of absorption. A plant of Spearmint has thus been found to absorb more than twice its own weight per day. Every one is familiar with the rapid disappearance of water from the roots of potted plants, as Hydrangea, Oleander.

461. An impervious epidermis destitute of stomata everywhere clothes the roots, excepting its *fibrillæ* and the tender extremities of the rootlets. No part, therefore, is capable of absorption except the latter. But these, by their multiplied numbers, present to the soil an adequate absorbing surface. Hence, in transplanting a tree, almost the only danger to its life arises from the difficulty of preserving a sufficient number of these rootlets.

462. The force with which plants absorb fluids by their roots is surprisingly great. If the stem of a Grapevine be cut off when the sap is ascending, and a bladder be tied to the end of the standing part, it will in a few days become distended with sap even to bursting. DR. HALES contrived to fix a mercurial gauge to a vine thus severed, and found the upward pressure of the sap equal to twenty-six inches of mercury, or thirteen pounds to the square inch.

463. But what causes this absorption of fluids in a direction contrary to gravitation? In explanation of this phenomenon reference has been made to two well-known principles in physics—viz., to capillary attraction by the tubular vessels, and to endosmose by the closed cells, which are far more numerous.

464. The effects of capillary attraction are seen in experiments like the following. Insert the end of several open thermometer tubes in a colored liquid. It will be seen rising in the tubes above its level to various heights—highest in the smallest calibre. Or suspend a napkin in such fashion that its lowest corner shall dip into a cup of water. In a few hours the water will have ascended into the napkin.

465. **Endosmose** is thus illustrated: Throw dried prunes, currants, or raisins into water. After a while they will have become swollen and distended with fluid. Now place them in strong syrup—they will again shrink. The *flowing in*, as in the first case, is called *endosmose;* the *flowing out*, as in the second case, is called *exosmose.* (See Class Book of Botany, § 781–783.) Another explanation of absorption is given in § 471.

466. **Other means of absorption.** The office of absorption is not performed by the root alone. Every green part, but especially the leaf, is capable of absorbing gases and watery vapor.

Every one knows how greatly plants, when parched and withered by drought, are revived by a shower which sprinkles their leaves without reaching their roots. Air-plants, or epiphytes (§ 208), such as the Long-moss and Epidendrum, must rely on this source chiefly for the supply of their food; and when the dissevered stems of such plants as the Houseleek grow without roots, suspended by a thread in air, it is evident that all their nourishment comes through their leaves.

467. The use of absorption in the vegetable economy is not merely the introduction of so much water into the plant, but to

obtain for its growth the elements of its food held in solution, whether gaseous or earthy. In attaining this object, the roots seem to be endowed with a certain power of selection or choice, which we cannot explain. Thus, if wheat be grown in the same soil with the pea, the former will select the *silica* along with the water which it absorbs, in preference to the lime; the pea selects the *lime* in preference to the silica. Buckwheat will take chiefly *magnesia;* cabbage and beans, *potash.* This fact shows the importance of the *rotation of crops* in agriculture.

Review.—460. Principal office of the Root. Illustrate by a young plant of Spearmint—By Hydrangea. 461. What special organs are the absorbents? What care in transplanting trees? 462. How prove the great force of absorption? 463. Causes of the ascent of the sap. Illustrate capillary attraction. 465. Illustrate Endosmose. What other explanation in § 471, and 480? 466. What other organs may absorb? Several illustrations. How are Tree-mosses nourished? 467. Uses of absorption to vegetation. Have the roots the power of choice? Give examples.

CHAPTER IX.

CIRCULATION.

468. The fluids which are thus taken into the system by absorption cannot remain inactive and stagnant. As their inward flow is regular and constant in its season, so must be their upward and outward flow, in a course more or less direct, toward the parts where they find an outlet or a permanent fixture.

469. In those Cryptogams which are composed of cellular tissue alone, the circulation of the sap consists only of a uniform diffusion from cell to cell throughout the mass, as through a sponge. In the higher plants, the different tissues perform appropriate offices in the circulation; some conducting upward, some downward, some conveying the crude sap, some latex, and some air.

470. Spiral vessels and others of the trachenchyma are generally filled with air, and take no part in the circulation of fluids, except in the Spring, when the whole system is gorged with sap. The intercellular passages, also, generally circulate air alone.

471. From the roots the newly absorbed fluid flows upward through the stems and branches, toward the buds, leaves, and flowers, being probably drawn thither into them by the exhala-

tion and consequent exhaustion there going on. That tissue of the stem and branches through which the ascending sap loves chiefly to travel, is the *pleurenchyma*—those long cells of the wood fibre, whether arranged in broad layers, as in the Exogens, or scattered in slender bundles, as in the Endogens. And when the stem grows old the sap ceases to traverse the inner layers, the duramen, where its passage becomes obstructed by thickened cell walls; and frequents only the outer newer layers, the *alburnum*, next adjoining the liber.

472. **The Crude Sap.** The fluid which thus flows upward seeking the leaves, consists largely of water, is colorless, and is called the Crude Sap. It contains in solution minute quantities of gases and mineral salts, imbibed by the roots, together with dextrine and sugar (no starch), which it dissolved out of the cells on its way. This is the fluid which flows so abundantly from incisions made in trees in early Spring.

473. The *overflow* of the sap depends upon the excess of absorption over exhalation. After the decay of the leaves in Autumn, and the consequent cessation of exhalation, the rootlets, being deep in the ground, below the influence of frost, continue their action for a time, and an accumulation of sap in the system, even in the air-vessels and spaces, takes place. Also in early Spring, before the leaves are developed, this action recommences; and the plant becomes gorged with sap, which will burst forth from incisions, as in the Sugar Maple, or sometimes spontaneously, as in the Grape. As soon as the buds expand into leaves and flowers, the overflow ceases.

474. **The True Sap.** Throughout its whole course to the leaves, the sap gains in density by solution. There arrived, it loses by exhalation a large part of its water, gains additional carbon, and undergoes other important chemical changes (hereafter to be noticed), and becomes the True Sap, dense and rich, both in nutritive matter for the *immediate* growth, and in special products for the *future* nourishment of the plant.

475. *Returning*, the true sap distributes its treasures in due and exact proportion as needed to every organ. Its course lies in the tissues of the bark, cellular and woody, first distributed over the under surface of the leaves, thence by the leaf-stalks into the liber, and so pervading all, down to the extremities of the roots.

476. On its passage it *makes deposits* of food, first in the cells, of the pith at the base of every incipient bud; then in the cambium region a copious store; next in the medullary rays a due

portion, some carried outward for the supply of the cortical layer, and some inward for solidifying the wood; and lastly, the residue, often the richest legacy of all, falls to the root, and fills every branch and fibre, however vast its extent. This last deposit is that which is first met and dissolved by the rising tide of fluid in the following Spring.

477. **Growth progresses downward.** Since the flowing of the true elaborated sap is downward, it scarce admits of a doubt that the progress of the growth is also downward, from the leaves to the roots. And on no other supposition can we account for such facts as the following.

478. Girdle an exogenous tree by removing an entire ring of its bark. It will flourish still during one growing season, and form a new layer of wood and bark everywhere above the wound, as before, but not at all below. The next season the tree will die. Why? Because the true sap returning cannot descend to nourish the roots. But in a few cases trees are said to have survived this process. In such cases the medullary rays may have completed the broken currents. On arriving at the ring, the descending sap flows inwardly by the medullary rays, making a detour, and appears again in the bark below the interruption. (See Class Book, p. 155, for a further illustration of this subject.)

Review.—468. Direction of the flowing sap. 469. How it advances in the tissue of a Cryptogam. How in the higher plants. 470. Vessels for air only. 471. Tendency of the flow. By what tissues? By which layers, and why? 472. The crude sap. 473. Account for the overflow—For its cessation. 474. The change to *true sap.* Trace its return from the leaves. 476. Specify the places of deposit. 477. Does growth progress upward or downward? 478. A proof.

CHAPTER X.

TRANSPIRATION AND RESPIRATION.

479. **Transpiration** relates to that important office performed by the leaves and other green organs, whereby pure water is separated from the crude sap and given off into the air. It takes place chiefly through the stomata, and is greatest by day, and in a warm, dry atmosphere.

480. Upon the activity of transpiration depends also the amount of absorption. It not only makes room for the fluids from below to enter, but by disturbing their equilibrium it creates an upward tendency, as the flame of a lamp draws the fluid up the wick. All the mineral and organic constituents of the sap are of course left behind, in the plant.

481. The quantity of pure water transpired by plants is immense. A forest makes a damp atmosphere for miles around. Dr. Hales, in a series of instructive experiments in transpiration, ascertained that a Sunflower three and a half feet high, with a surface of 5,616 square inches, transpired from 20 to 30 oz. in twelve hours; a Cabbage 15 to 25 oz. in the same time—equal to the transpiration of a dozen laboring men.

482. **Respiration** in plants refers to their relations to the atmosphere. So in animals. These relations are in either case vitally important, as may be shown by placing a small, healthy potted plant (sc. Geranium, Mimosa) under the receiver of an air-pump, and thoroughly exhausting the air. At once every vital process ceases—-no absorption, no assimilation, no irritability, but speedily decay ensues. A vacuum would be no more fatal to a sparrow. Air is quite as necessary to the one as to the other.

483. Respiration in plants, or *aeration* (as sometimes called), consists of all those operations by which the sap is brought into contact with the air or subjected to its influence. It occurs in the intercellular passages, in the spiral vessels everywhere, but especially in the leaves and all other organs which have chlorophyl and stomata. Its vital importance is manifested in the vast extent of the respiratory apparatus, consisting of millions of leaves and billions of breathing pores (stomata) and tracheæ (vessels)!

484. The facts connected with respiration, which seem to have been well established by the experiments of Saussure, Garreau, Moué, Draper, etc., are these: 1. Carbonic acid ($C\ O_2$) is absorbed by the leaves and all green tissues, under the direct solar light.

2. Oxygen (O) is absorbed by the leaves and all green tissues in the absence of direct solar light, and by the roots, flowers, fruits, and germinating seeds at all times.

3. The oxygen thus absorbed unites with some of the free (or nascent) carbon already in the tissues, and forms carbonic acid.

4. By a process of *assimilation* (§ 439), carbonic acid within the green tissues, from whatever source derived, is decomposed under the direct sunshine, and its carbon is retained; but,

5. Its oxygen is set free and exhaled.

6. Carbonic acid is exhaled by the leaves and all the green

tissues in the absence of the sunshine, and by all other parts (root, flowers, fruit, and germinating seeds) at all times.

485. Hence it appears that there are *two phases* of aerial action constantly performed and seemingly opposed to each other. One dependent wholly upon the clear sunshine, in which, by the leaves, etc., $C\ O_2$ is absorbed, decomposed, and O returned to the atmosphere; the other, in which O is absorbed, and $C\ O_2$ exhaled, by the leaves in the absence of sunshine, and by all other parts (roots, flowers, etc.) at all times. Both are equally and vitally important.

486. The former process becomes visible to the eye by the rapid development of chlorophyl accompanying it—the latter by its gradual loss. Hence, during a protracted season of cloudy weather, vegetation grows sensibly paler; but a few hours of sunshine restores the green to its wonted depth and richness. Hence, also, plants growing in darkness or shade, as potatoes in the cellar, are very pale, and manifest their affinity for light by stretching themselves with famishing eagerness toward the slender sunbeam which gains admittance. Analysis shows structures thus grown to be deficient in carbon.

487. We may easily repeat the experiments of Saussure and Priestley. Place a quantity of freshly gathered leafy stems under a bell-glass inverted and full of rain-water, and thus expose them to the sunlight. Soon bubbles of pure oxygen gas arise and slowly collect above. Now repeat the experiment with boiled or distilled water, and no oxygen will appear. Rain-water contains CO_2 in solution; boiled water does not. The O must therefore have come from the CO_2 as would appear.

488. If we enclose, air-tight, in a glass globe the end of a leafy branch, without severing it from the tree, it will be found by careful analysis, after a day of sunshine, that the proportion of O has increased at the expense of CO_2 within the globe; and *vice versa* by night or in the shade.

489. *The results* of both transpiration and respiration, as concerns the plant, tend to concentrate the diluted sap by the elimination of the water, which served merely for its conveyance, and to assimilate it into food capable of being organized into cells and their various contents. And it is proper in this place also to notice *the effects* of this vast machinery upon the constitution of the atmosphere and its relation to the animal kingdom.

490. Carbonic acid gas is dissolved in the atmosphere and somewhat uniformly diffused throughout its whole extent, in the proportion of about 4 parts in 10,000, or $\frac{1}{2250}$. This gas flows, and is ever flowing into the air from decaying animal and vegetable substances, from combustion, and from the breath of all living animals. The quantity thus added to the atmosphere annually is estimated at 100 billions lbs., or nearly one-tenth of the whole amount of carbon, and yet it does not accumulate. Now if we were able to compute in pounds the annual growth of the

entire plant world, and the proportion of solid carbon which enters into that amount, we should doubtless find that the grand total of the demand equals this grand total supply.

491. And further: not only are the necessities of the plant met by this wonderful circulation, but the necessities of animal existence also. Carbonic acid is poisonous; and should it be left to accumulate unchecked, it would gradually corrupt the air, and within a few centuries extinguish all animal life. Thus are the two kingdoms of the organic world mutually, through the inorganic, dependent upon each other. The plant furnishes the oxygen which the animal consumes, the animal the carbonic acid which the plant consumes, while each would perish in an atmosphere of its own production. "Great and marvellous are thy works, O Lord of Hosts! in wisdom hast thou made them all."

Review.—479. What is transpiration? It occurs where and when? 480. Why is absorption dependent upon it? What only does it expel? 481. How much water did a Sunflower transpire in a day?—A Cabbage? Effect of a forest on the Atmosphere? 483. Import of Aeration. Vastness of the Apparatus. 484. *Six facts* in Respiration. 485. The two opposite phases of respiration. 486. When does the former phase become visible? When the latter? Blanched plants. 487. Saussure's Experiments. Why no oxygen with boiled water? 489. The results of transpiration and respiration. 490. What proportion of CO_2 in the Air? Whence is it? How much added yearly? Does it accumulate? Why not? 491. How might the air become poison? The mutual dependence of Plants and Animals.

PART THIRD.

SYSTEMATIC BOTANY.

CHAPTER I.

GENERAL PRINCIPLES OF CLASSIFICATION.

492. Systematic Botany relates to the arrangement of Plants into Groups and Families according to their characters, for the purpose of facilitating the study of their names, affinities, habits, history, properties, and uses. In this department the principles of Organic and Physiological Botany are applied and brought into practical use.

493. But there is another and higher import in the study of Systematic Botany. It shows us Plants as related to each other and constituting one magnificent system. It reveals the Almighty Creator at once employed in the minutest details and upon the boundless whole; equally attentive to the perfection of the individual in itself, and to the completeness of the Grand System of which it forms a necessary part.

494. The necessity for such an arrangement of the Species will appear when we consider their immense numbers. They meet us in ever-varying forms at every step, clothing the hills, mountains, valleys, and plains. They spring up in hedges and by the wayside. They border the streams and lakes, and sprinkle over their surface. They stand assembled in forests, and cover with verdure even the depths of the Ocean. Not less than 100,000 kinds are already distinguished, and the catalogue is still increasing.

495. Into this vast kingdom of Nature the student is introduced, and proposes to acquaint himself with each and every object. How shall he begin? Evidently he must *begin* with the individual—a single individual plant. But (thanks to Him who created both the plant and the mind—the object and the subject), we are not left to *continue* the study in a method so endless and so hopeless. As if in special regard to the measure of the human intellect and the means of its culture, the Great Author of Nature has grouped these myriads of individuals into

496. **Species** (§ 27). When He called plants into existence, in their own specific forms, He endowed each with the power of *perpetuating its own kind and no other;* so that they have descended to us distinguished by the same characters and properties as at the beginning. When, therefore, the student has formed acquaintance with any one individual plant, he is also acquainted with *all other individuals belonging to the same species.*

497. For example: a single plant of *White Clover* is a true representative of all the millions of its kind that grow on our hills and meadows. Likewise, a single description of the *White Pine* will answer in all essential points for every individual tree of that noble species in all its places and times. Thus all the individual plants of the globe are grouped into species by *descent* and *resemblance.*

498. **Genera** (§ 29). Although the species are separated from each other by clear and definite distinctions, still they are found to exhibit, also, constant affinities whereby they stand associated into larger groups called *genera.* Thus the White Clover and the Red Clover (Trifolium repens and T. pratense) are universally recognized as different species, but of the same kind or genus; and a proper *generic* description of one plant of the genus TRIFOLIUM will convey intelligence to a certain extent concerning every other plant belonging to its 150 species.

499. **Orders.** But natural affinities do not end here. The genera are yet too numerous for the ready and systematic study of the naturalist. He, therefore, would generalize still further, and reduce the genera to still fewer and broader groups. On comparing the genera with each other, he finds that they also possess in common certain important characters which are of a more *general* nature than those which distinguish them from each other. By these general characters the genera are associated into Orders.

500. For example: comparing such genera as the Mustard, Radish, Cabbage, Cress, Wallflower, etc., it is seen that, while they differ sufficiently in their generic characters, yet they all have certain marked resemblances in their didynamous stamens, siliquous fruit, whereby they are obviously associated into the same Order—the Cruciferæ. So, also, the Pines, the Spruces, the Cedars, the Larches, and the Cypress, while as genera they are obviously distinct, yet all bear cones of some form, with naked seeds; hence they are naturally grouped into one Order—the Coniferæ.

501. **Classes.** In like manner the Orders, by traits of resemblance still more general, are associated into a few groups, each of great extent, called Classes.

502. **Intermediate Groups**, formed on the same principles, are recognized as Subgenera, Suborders or Tribes, and Subclasses or Cohorts, which will be particularly noticed in another place. Of the same nature, also, are Varieties, which are groups subordinate to species, already described in § 28.

503. **Systems.** Two independent and widely different methods of classifying the genera have been generally approved—the Artificial Method of Linnæus, and the Natural System of Jussieu. The former is founded solely on characters relating to the organs

of fructification, leaving all other natural affinities out of view. It is simply an arrangement devised by Linnæus for convenience in the analysis of plants—as words in a dictionary, for convenience of reference, are arranged *alphabetically*, without regard to their nature. It is now generally superseded by—

504. **The Natural System.** This system of classification, on the contrary, takes for its basis all those natural affinities and resemblances of plants whereby Nature herself has distinguished them into groups and families. It seizes upon every character wherein plants agree or disagree, and forms her associations only upon the principle of natural affinity. Hence, each member of any natural group resembles the other members; and a fair description of one will serve, to a certain extent, for all the rest.

505. The species and genera are formed on this principle of classification, as above stated, and are truly natural associations. Individuals altogether similar—cast, as it were, in the same mould—constitute a species. Species agreeing in nearly all repects, and differing but in few, constitute a genus. Thence the genera, associated by their remaining affinities into groups of few or many, by this same method are organized into Natural Orders and other departments of the System.

Review.—492. Object and use of Systematic Botany. 493. A still higher import. 494. Show the subject to be vast. 495. A wrong way to study it. 496. How the species are limited. A short road to knowledge. 497. Give examples. Define a Species in the words of § 27. Define a Genus (§ 29). 498. How exemplify a genus? 499. Give the third step in classification. 500. How is the Order of Crucifers made up?—The Conifers? 502. Name four sorts of intermediate groups. What is said of the Variety in § 28? 503. Two methods of classifying the genera. Define the Artificial. Its author. 504. Define the Natural System. Its purpose. 505. Synopsis of the groups.

CHAPTER II.

THE NATURAL SYSTEM.

506. There is indeed but one truly Natural System. Yet so long as any portion of that System remains imperfectly understood, so far authors may be expected to hold different views, and to attempt by different methods to express that true System. But the discrepancies observed in the several "Natural Systems" proposed by different writers, are slight compared with the num-

ber and importance of the principles now common to them all, and universally admitted.

Let us begin with the VEGETABLE KINGDOM as a whole.

507. **Sub-kingdoms.** It is first divided or separated into two Sub-kingdoms, viz., the Phænogamia, or Flowering Plants, and the Cryptogamia, or Flowerless Plants. These divisions were first propounded by John Ray, of England, in 1682. They lie at the foundation of the System of Linnæus as well as that of Jussieu, and have been adopted by every subsequent author. It is a division founded in Nature—that is, marked by Nature herself; for,

The PHÆNOGAMIA (φαίνω, to appear, γάμος, nuptials)—	The CRYPTOGAMIA (κρύπτω, to conceal, γάμος)—
a, Consist of a regular axis of growth with leafy appendages;	*a*, Are generally destitute of a regular axis and of true leaves;
b, They possess a woody and spiro-vascular structure;	*b*, They possess mostly only a cellular structure;
c, They develop stamens and pistils constituting flowers;	*c*, They do not develop true flowers;
d, They produce seeds containing an embryo.	*d*, They produce spores having no embryo.

508. The above diagnosis does not mark the absolute limits between the two Sub-kingdoms; for the higher Cryptogams, as the Ferns and Mosses, give indications of approach to the Phænogams, both in form and structure, while the lower Phænogams can scarcely be said to produce flowers. And universally, so gradual is the transition from group to group, that it is difficult or impossible to employ characters so definite as to circumscribe completely any one group, while at the same time they exclude every member of the surrounding allied groups.

509. **Provinces.** The Flowering Plants are next resolved into two great Provinces, indubitably marked by Nature's own hand, and employed in every natural method. The following is their diagnosis. They were also first propounded by John Ray, under the names of Dicotyledons and Monocotyledons.

EXOGENS (ἔξω, outside, γεννάω, to generate or grow)—	ENDOGENS (ἔνδον, within, γεννάω, to grow, etc.)—
a, Growing by layers external to the wood, internal to the bark;	*a*, Growing by scattered, internal wood-bundles;
b, Leaves net-veined;	*b*, Leaves parallel-veined;
c, Flowers very rarely 3-parted;	*c*, Flowers very generally 3-parted;
d, Seeds with two or more cotyledons;	*d*, Seeds with one cotyledon; and
e, The radicle producing an axial root.	*e*, The radicle never producing an axial root.

510. **Classes.** The Provinces are next broken into Classes, groups of the third rank in extent. Two are constituted of the Exogens, viz.:

Angiosperms (*αγγε͂ιος*, a vessel, *σπέρμα*, seed), (Oak, Rose)—	Gymnosperms (*γυμνὸς*, naked, *σπέρμα*), (Pine, Yew)—
a, Flowers more generally perfect;	*a*, Flowers imperfect;
b, Pistils complete, enclosing the ovules;	*b*, Pistils scale-like, with no stigma;
c, Seeds enclosed in a pericarp;	*c*, Seeds naked, not in a pericarp;
d, Embryo with only two cotyledons.	*d*, Embryo mostly with several whorled cotyledons.

511. Two Classes also constitute the Endogens, viz.:

The Petaliferæ (*πέταλον*, a petal, *φέρω*, to bear)—

Plants of the endogenous structure, having continuous stems and petaloid flowers; that is, flowers invested with a whorled perianth or none (Lily, Orchis, Rush).

Glumiferæ (*gluma*, husk, *fero*, to bear)—

Plants of the endogenous structure, having jointed culms and glumaceous flowers; that is, invested with an imbricated perianth of green glumes (Grasses, Grains, Sedges).

512. **Cohorts.** The Classes are each of great extent, both as to the number and the diversity of their families, and obviously require a further subdivision. To effect this on *strictly natural* principles, botanists have labored hitherto in vain. The truth is, the members of these several classes are united by affinities so equable as to render a further subdivision impossible except by distinctions more or less arbitrary. So adjacent territories, where rivers or other natural boundaries are wanting, must be separated by *artificial lines.*

513. The Angiosperms were subdivided by Endlicher into three cohorts, and nearly all modern botanists have adopted his plan under various names.

1. *Dialypetalæ* (*διαλύω*, to dissolve). Exogenous plants, having both calyx and corolla, the latter composed of distinct petals (*polypetalous*), sometimes slightly cohering by the base of the stamens, rarely abortive.
2. *Gamopetalæ* (*γαμός*, union). Exogenous plants, having both calyx and corolla, the latter composed of petals more or less united (*monopetalous*).
3. *Apetalæ* (*α*, privative). Exogenous plants with flowers having a calyx only, or neither calyx nor corolla (*achlamydeous*).

514. The class PETALIFERÆ may be conveniently separated into two cohorts as follows:

1. *Spadicifloræ.* Endogenous plants with flowers having no perianth, or a scaly one, and borne on a thickened spadix, which is often enveloped in a spathe.
2. *Florideæ.* Endogenous plants with the flowers usually perfect and complete, the perianth double, 3-parted, the outer often, and sometimes both, green.

515. The class Glumiferæ is equivalent to the cohort *Graminoideæ*, including the Sedges, Grains, and Grasses—a truly natural assemblage.

516. **The Sub-kingdom** Cryptogamia is resolved into groups which are analogous to those of the Phænogamia. First,

it is naturally divided into two Provinces, founded upon their mode of vegetation. The Acrogens include those tribes which make some approach toward the Phænogams, while the Thallogens include the lowest tribes of the vegetable kingdom. They are thus distinguished—

ACROGENS (άκρον, the summit or point, γεννάω)—

Flowerless Plants having a regular stem or axis, which grows by the extension of the apex only, generally with leaves, and composed of cellular tissue and scalariform ducts (Ferns, Mosses, Club-mosses, Horsetails, etc.)

THALLOGENS (θάλλον, green expansion, γεννάω)—

Flowerless Plants producing in vegetation a thallus—an indefinite expansion or mass, with no distinction of stem, leaf, or root, composed of cellular tissue only (Lichens, Fungi, etc.)

517. **Classes** of the Flowerless Plants. For the sake of analogy and an advantageous comparison with the Phænogams, we may also regard these two provinces of the Cryptogams in the light of Classes founded upon their different modes of fruit-bearing. Thus the Acrogens constitute the class—

ANGIOSPORÆ (αγγε͂ιος, σπορὰ), or Angiospores:

Acrogenous plants, producing their spores in sporangia (vessels) which burst when the spores are mature.

And the Thallogens constitute the class—

GYMNOSPORÆ (γυμνὸς, σπορὰ), or Gymnospores:

Thallogenous plants reproduced by spores, which are produced in parent cells, either forming a part of the vegetating thallus, or growing upon the surface of some definite region of the thallus.

518. The class ANGIOSPORES is divided into three cohorts (or Alliances according to Lindley):

Lycopodales. Acrogens with vascular tissue, spores of two kinds, and spore-cases axillary or radical, one—many-celled. Plants with well-developed leaves. (Lycopodiaceæ, Marsileaceæ.)

Filicales. Acrogens with vascular tissue, spores of but one kind, spore-cases borne on the margin, back, or summit of the frond, one-celled, usually girded by an elastic ring. Plants leafy or sheathed. (Equisetaceæ, Filices.)

Muscales. Acrogenous plants mostly cellular, with two kinds of floral organs (antheridia and archegonia), and spore-cases (thecæ) either hooded or immersed in the substance of the frond. (Mosses, Hepaticæ, etc.)

519. The class GYMNOSPORES also consists of three cohorts:

Lichenales. Thallogens growing in air, crustaceous, without mycelium, including spores plunged in the thallus as well as in shields. (Lichens.)

Algales. Thallogens living in water or very damp places, cartilaginous, brightly colored, without mycelium, nourished through their whole surface. (Algæ, or Seaweeds.)

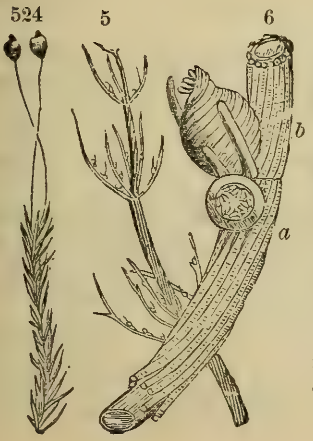
Fungales. Thallogens fructifying in the air, never green, nourished by their own mycelium, which is immersed in, and feeds upon decaying substances. (Fungi.)

520. The following is a condensed tabular view of the Natural System as above constituted.

THE VEGETABLE KINGDOM.

The Sub-kingdom Phænogamia, or Flowering Plants.
- Province 1st.—*Exogens*, or *Dicotyledons*.
  - Class I.—Angiosperms.
    - Cohort A.—Dialypetalæ, or Polypetalous Exogens (Roseworts).
    - Cohort B.—Gamopetalæ, or Monopetalous Exogens (Phloxworts).
    - Cohort C.—Apetalæ, or Apetalous Exogens (Pokeworts).
  - Class II.—Gymnosperms.
    - Cohort D.—Conoideæ, or Cone-bearing Plants (Pines).
- Province 2d.—*Endogens*, or *Monocotyledons*.
  - Class III.—Petaliferæ, or Aglumaceæ.
    - Cohort E.—Spadicifloræ (the Aroids, etc.)
    - Cohort F.—Florideæ (Lilyworts, etc.)
  - Class IV.—Glumiferæ, glumaceous Endogens.
    - Cohort G.—Graminoideæ (Grasses, etc.)

The Sub-kingdom Cryptogamia, or Flowerless Plants.
- Province 3d.—*Acrogens*, the Point-growers.
  - Class V.—Angiospores.
    - Cohort H.—Lycopodales, or Lycopods.
    - Cohort J.—Filicales, or Ferns.
    - Cohort K.—Muscules, or Mosses.
- Province 4th.—*Thallogens*, the Mass-growers.
  - Class VI.—Gymnospores.
    - Cohort L.—Lichenales, the Lichens.
    - Cohort M.—Algales, the Seaweeds.
    - Cohort N.—Fungales, or Fungi.



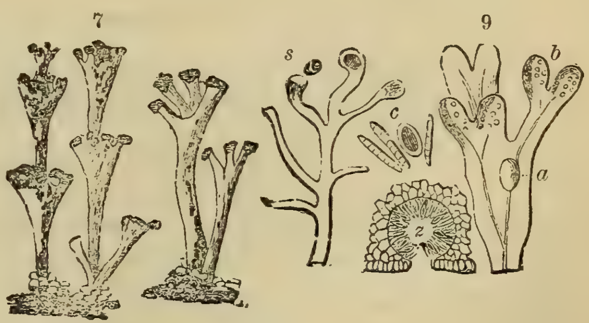


Fig. 524, A Moss (Bartramia). 525, Chara ; 526, a portion magnified. 527, Lichens (Cladonia). 528, 9, Seaweeds ; 8, Vaucheria ; *s*, a spore just discharged ; 9, Fucus ; *a*, air-vessel ; *b*, fruit ; *z*, section of one of the fruit-clots ; *c*, a spore with paraphyses.

521. **Orders** or **Families** succeed to the Cohorts. The *Natural Order* is perhaps the most important of all the associations. On the accuracy and distinctness of the characters of these groups botanists have bestowed the highest degree of attention, and the student's progress will largely depend upon his acquaintance with them.

522. Orders are formed by associating together those genera which have the most intimate relations to each other, or to some one genus previously assumed as the type. As species form genera, so genera form Orders. In regard to extent, they differ widely; some consisting of a single genus, as Platanaceæ, while others comprehend hundreds of genera, as Compositæ. For convenience in analysis, the larger Orders are broken up into Sub-orders or Tribes.

523. The Natural System, then, with all its divisions, groups, and subordinations, may be exhibited at one view, as follows:

The VEGETABLE KINGDOM consists of
  Two SUB-KINGDOMS,
    Four PROVINCES,
      Six CLASSES,
        Thirteen COHORTS, with Alliances,
          300 ORDERS, with Sub-orders and Tribes,
            20,000 GENERA, with Sub-genera,
              100,000 SPECIES, with Varieties, and
                Finally, of INDIVIDUALS.

CHAPTER III.

BOTANICAL ANALYSIS

Is the application of the rules and principles of botany to the study of the natural plant, in order to determine its place in the system, its names, history, uses—all that is on record concerning it.

524. In the flowering months the learner will constantly meet with new forms of bloom; and if he is duly interested in the

science, he will not fail to seize and analyze each new flower while the short hour of its beauty may last. Thus in a few seasons, or even in one, he may become well acquainted with the *flora* of the vicinity where he dwells.

525. Suppose, now, the pupil to be in possession of an unknown plant in flower and fruit. The first requisite is, its Natural Order, and the first step in *analysis* is an examination of the several organs, one by one, until the general structure is well understood. This done, the *experienced* botanist, who has in memory the characters of all the Orders, might determine at once to which of them the plant in question belongs. But the *beginner* must be content with a longer course of inquiry and comparison,—a course which might be indefinitely long and vague without the use of—

526. **Analytical Tables.** These are designed to shorten and define to exactness the processes of analysis. Those which appear in the present work are peculiar in form, and more copious and complete than the tables of any other similar work. These tables, with proper use in connection with the specimen, will very rarely fail to conduct the inquirer almost immediately to the right Order, Genus, and Species.

We subjoin a few examples of the analysis of particular species by the aid of these tables. If the exercise be conducted in the class-room, the successive steps in the process (indicated by the numbers 1, 2, 3, &c., below) may be assigned, in order, to each pupil in the class.

ANALYSIS OF A POLYPETALOUS HERB.

527. **To determine the Cohort.** A good specimen of a little yellow-flowered herbaceous plant, common in the grassy fields of cool regions, is supposed to be now in the hands of each pupil of the class. (1.) The first pupil, reading (if necssary) the characteristic of each sub-kingdom, pronounces the plant one of the Phænogamia, and refers the next pupil to the Provinces, 1 or 2.

(2.) The next reads the characters of those Provinces, and comparing the specimen (which has *net-veined leaves* and 5-*merous flowers*), concludes that it is an Exogen. Refer next to the Classes, 1 or 2.

(3.) "Stigmas present. Seeds enclosed in vessels."

"Stigmas none. Seeds naked. (Pines, Spruces, &c.)" Our plant has stigmas, &c., and, moreover, is not a Pine, Spruce, &c. It is, therefore, an Angiosperm. Refer next to Cohorts 1, 2, or 3.

(4.) "Corolla with the petals distinct." This characterizes our plant, and it is pronounced one of the Polypetalæ. Refer them to **A**.

528. **To determine the Order,** the (5th) pupil reads the first *alternative*, or triplet, noted by a star (*), and comparing his plant, finds it to correspond with the first line, for it is an "herb with alternate leaves." Pass now to (11).

(6.) "Flowers regular or nearly so. Fruit never a legume."

"Flowers irregular," &c. The flower is regular. Pass to (13).

Again, a (7th) pupil reads, "Stamens 3—10 times as many as the petals." "Stamens few and definite." The stamens are many. Pass to (15).

(8). The next pupil reads, compares, and determines that the stamens are "perigynous on the base of the calyx," and announces the letter (*d*) as the reference to the next alternative. (9.) Next, the pupil reads and compares his specimen with the triplet (*d*), and concludes that the sepals are 5, and imbricated in the bud. Consequently, it is announced that the plant in hand belongs to the Order ROSACEÆ.

529. **To determine the Genus.** After a careful comparison of their specimen with the diagnosis of the Roseworts (Order 44), in order to verify the analysis thus far, the learner or the *class* will then consult the table of the Genera. (10.) A pupil reads the couplet marked **A**, and determines that the "Ovary is superior, fruit not enclosed," &c. Pass to (*a*).

11. "Carpels ∞. Calyx persistent, with 5 bractlets added," characterizes our plant. Pass to (*f*), which is Tribe V. Pass on to (*g*). (12.) The next pupil determines that the "style is deciduous." Pass to (*k*). (13.) "Torus spongy or dry," is true of our specimens. Pass to (*l*). (14.) "Bractlets 5" reads the next, and announces the plant to be a Potentilla. Now all turn to Genus 13, and together verify this result by reading and comparing the stated character of the genus.

530. **To determine the Species.** (15.) As our plant has "stamens ∞ and flowers yellow" it must be a *true* Potentilla. Pass to (*a*). (16.) "Leaves palmately 3-foliate" suits our plant. It is, therefore, either species No. 3, 4, or 5. Lastly (17), after a due comparison of their plant with each of these three species, it is determined that it is P. Norvegica.

ANALYSIS OF AN ENDOGEN.

531. A grass-like, blue-flowered herb is now supposed to have been discovered and distributed to the Class for analysis. Having (1) determined that it is an Endogen (for it has "parallel-veined leaves and 3-parted flowers"), they would now (2) determine its Class, whether the 3d or the 4th. They read,

"Flowers without glumes, and colored," &c.

"Flowers with green alternate glumes, and no perianth." The first line is adopted, and Petaliferæ is its Class. Pass next to (†) Cohorts 5, 6, or 7, and read,

(3.) "Cohort 5. Flowers on a spadix, apetalous or incomplete."

"Cohort 6. Flowers complete, with a double perianth"—which answers to the specimens in hand, and it is seen to belong to the Florideæ. Pass to **F**.

(4.) The next pupil having read and compared the first couplet under "**F**, Cohort 6, Florideæ," chooses the second line. Pass to No. 3. (5.) "Perianth tube adherent to the ovary" is adopted. Pass to (*a*). (6.) "Flowers perfect"—the third number of this couplet, is true of our plant. Next, the dash (—). (7.) "Flowers 3–6-androus, with stamens free," is found to meet the case. Pass to (*b*). (8.) "Perianth glabrous outside" is true. The dash (—). (9.) "Stamens 3, anthers extrorse," is also true, and our plant belongs to the Order IRIDACEÆ.

532. To determine the Genus and Species under the Irids, Order 146, is the next and the last step. Having carefully compared their specimens with the characters ascribed to the Irids, the pupils next apply to the Table of the Genera. (10.) "Flowers regular and equilateral," in the first dilemma, is chosen. Read the (*) couplet next. (11.) "Sepals similar to the petals in form, size, and position" is true. Next to (*a*). (12.) "Stamens monadelphous. Flowers small, blue. Plants grass-like," describes the plant truly, and it must be a Sisyrhinchium. They turn to Genus 7, and verify by reading its characters. Lastly, the brief diagnoses of the two species are compared, and the plant is found to be S. Bermudiana.

CHAPTER IV.

RULES IN NOMENCLATURE.

533. **The Names of the Orders** are Latin adjectives, feminine, plural (to agree with *plantæ*, plants, understood), usually derived from the name of the most prominent, or leading genus, by changing or prolonging the termination into *aceæ*, as *Rosaceæ*, the Rose tribe, *Papaveraceæ*, the Poppy tribe, from Rosa and Papaver. Earlier names, however, derived from some leading character in the Order, and with various terminations, are still retained. Thus, *Compositæ*, with compound flowers; *Labiatæ*, with labiate flowers.

534. **Generic Names** are Latin substantives, arbitrarily formed, often from some medicinal virtue, either supposed or real, or from some obvious character of the genus; sometimes from the native country of the plants, or from the name of some distinguished botanist, or patron of botany, to whom the genus is thus said to be dedicated. Also the ancient classic names, either Latin or Greek, are often retained. Examples of all these modes of construction will be hereafter seen.

535. **Specific Names** are usually Latin adjectives, singular, and agreeing in gender with the name of the genus to which they belong. They are mostly founded upon some distinctive character of the species; as, Viola *blanda*, Sweet-scented Violet; V. *cucullata*, Hood-leaved Violet. Frequently the species is named after some other genus, which, in some respect, it resembles; as Viola *delphinifolia*, Larkspur Violet.

536. **Commemorative Specific Names.** Species, like genera, are also sometimes named in commemoration of distinguished persons. The rules given by Lindley, for the construction of such names, are: 1st. If the person is the discoverer, the specific name is a substantive in the genitive case, singular number; as, Viola *Selkirkii*, Selkirk's Violet; Lobelia *Kalmii*, Kalm's Lobelia. 2d. If the name is merely conferred in honor of the person to whom it is dedicated, it is an adjective ending in *nus*, *na*, or *num* (according to the gender of the generic

name); as, Tulipa *Gesneriana*, Gesnerian Tulip, or Gesner's Tulip; Erica *Linneana*, Linnæus' Heath.

537. **Rules for the use of Capitals.** The names of the order, the sub-order or tribe, and of the genus, should always commence with a capital letter. The name of the species should never commence with a capital except in the following cases: (1), when it is derived from the name of a person or of a country, as Phlox *Drummondii*, Aquilegia *Canadensis*; (2), when it is a substantive, as Delphinium *Consolida*.

538. **Synonyms.** Very frequently, the same species has been described by different (or even by the same) authors, under different names. In such cases it becomes a question, often of difficult solution, which name is to be adopted. Obviously, the *prior* name, that is, the original one, if it can be ascertained, is entitled to the most respect; and it is a rule with botanists to adopt this name, unless it has been previously occupied, or be strongly objectionable on some other account. All other names are *synonyms*.

539. **Authorities.** In the *flora* which accompanies this work, immediately after the Genus we insert the abbreviated name of the author by whom it was originally published, with a comma between, thus: **Trifolium**, Tourn. After a *species* the authority is inserted *without a comma*, as **T. repens** L.,—that is to say, Trifolium repens (of) Linnæus. In changing the *generic* relations of a species (as subsequent writers often deem necessary), it is a custom for the author of the change to annex his own name, or a blank, instead of the original authority. The custom is often unjust, and always liable to abuse. It offers a bribe for innovations in the Genera, and recent works abound in changes which otherwise could scarcely be accounted for. When such changes become *necessary*, the just and proper rule (actually adopted in *Conchology*) is the following. Let the original specific name and authority both be retained, the latter in parenthesis, thus, Lychnis Githago (Linn.)—originally Agrostemma Githago Linn. This method is often but not always used in the present work.

Authorities for our species of exotic cultivated plants, for want of space, have all been here omitted.

INDEX AND GLOSSARY.

A (α, privative), prefixed to a Greek word, signifies without; as *aphyllous*, without leaves.
Abbreviations, page 3, Part IV.
Abortion, non-development of a part.
Absorption, 460.
Acaulèscent, apparently stemless, 223.
Accessory, something superadded.
Accrescent, growing after flowering, 109.
Accumbent, lying against a thing, 183.
Ácerose or *acerous*, needle-shaped, 299.
Achénium, plural, *achenia*, 151.
Achlamydeous, without floral envelopes.
Acícular, finely needle-shaped.
Acotylèdonous, without cotyledons.
Ácrogens, summit-growers, 425.
Acúleate, armed with prickles.
Acuminate, drawn out into a point, 307.
Acute, ending in a sharp angle, 307.
Adherent, growing to, 82, 94.
Adnate, growing fast to, 114.
Adventitious, growing out of the usual or normal position, as roots, 206.
Aeràtion, same as Respiration, 483.
Æstivation, 335.
Affinity, resemblance in essential organs.
Age of trees, 47.
Aggregate, assembled close together.
Aglumaceous, without glumes, the same as Petaliferæ, 514.
Air-bladders, 323.
Air-plants, 208.
Ala, wing; *Alæ*, wings, 101.
Alate, winged, 274.
Albùmen, 179. Albùminous, 178.
Albúrnum, sap-wood, 410.
Algæ, seaweeds, 519.
Altérnate, 215, 262.
Alvèolate, with pits like the honey-comb.
Ament, a deciduous spike, 357.
Amorphous, without definite form.
Amphítropous, 141.
Amplexicaul, stem-clasping, 275, 311.
Analysis, Botanical, 523.
Anastomòsis, reunion of vessels or veins.
Anátropous, 141.
Ancípital, two-edged.
Andrœcium, 110.
Andrógenous, stamens and pistils on the same peduncle.
Angiospérmæ, angiosperms, 510.
Angiospores, 517.
Animal, 15.
Annual, yearly (sc. plants), 40.
Annular cells, 378.
Anterior, parts (of a flower) adjacent to the bract.
Anthelmíntic, expelling or killing worms.
Anther, 111, 113.
Anthésis, the opening of the flower; flowering.
Antherídia, the staminate organs of Mosses.
Apetalæ, 513. Apetalous, without petals.
Aphyllous, without leaves.
Apóphysis, a swelling, *e. g.*, under the thecæ of some Mosses.
Apparatus, 4.
Appendicular organs, 77.
Appréssed, closely applied but not adhering to; the same as adpressed.
Ápterous, without wings.
Aquátic, living in water.
Aráchnoid, resembling cobwebs.
Arbòreous, arborescent, tree-like.
Archegònia, the pistillate organs of Mosses.
Arcuate, arched or curved like a bow.
Áreolate, having the surface divided into little spaces or areas.
Aril, an extra seed-covering, 175.
Aristate, with an arista or awn (Barley).
Armed, bearing prickles, spines, etc.
Articulated, jointed, as the culm of Wheat.
Ascending, arising obliquely; assurgent.
Ascídia, leaves holding water, 322.
Assimilation, 439.
Attenuate, becoming slender or thin.
Auriculate, ear-bearing, 291.
Awn, the beard of Barley and the like.
Axial root, 200.
Axil (arm-pit), the angle between the petiole and the branch, on the upper side.
Áxillary, growing out of the axils.
Axis, ascending, 211, 212; erect, procumbent, prostrate, trailing, decumbent, 212; excurrent, solvent, 226; descending, 197

Baccate, berry-like; covered with pulp.
Banner, same as Vexillum, 101.
Banyan tree, 207.
Bark, 411.
Básilar, basal, attached to the base, 136.
Bast-cells, wood-cells of bark, 412.
Beaked, ending in an extended tip.
Bearded, with tufts of long, weak hairs.
Berry, 159.
Bi, *Bis*, twice (in compound words).
Bícolor, two-colored.
Bicuspidate, with two points or cusps.
Bidentate, with two teeth.
Biénnial, of two years, 41.
Bifid, cleft into two parts.
Bífoliate, with two leaflets.
Bifúrcate, twice forked, or merely forked.
Bilábiate, two-lipped.
Binate, 303.
Bipinnate, 304.
Bipinnatifid, twice pinnatifid. (Fig. 342.)
Biternate, twice ternate, 305.
Bívalved, two-valved.
Blade. (See Lamina, 271.)

Blanched (plants), whitened for the want of light, § 486 (See Etiolated.)
Bloom, a fine white powder on some plants.
Border, 91, 92.
Botany defined, 18.
Botany, Elementary, 20, 368, etc.
Botany, Physiological, 21, 436.
Botany, Systematic, 22, 153.
Bráchiate, with opposite, spreading branches (arms). (Fig. 275.)
Bract, 329, 345.
Bracteate, having bracts.
Bracteoles or bractlets, 345.
Branches, 34, 214.
Bristles, stiff, sharp hairs.
Bryólogy, the science of Mosses.
Bud, 33. Budding, 259.
Buds, axillary, 247; accessory, 250.
Buds, adventitious, 251.
Buds, suppression of, 248.
Bud-scales, 246, 319.
Bulb, 240; tunicated, 242; scaly, 242.
Bulblets, 260.

Caducous, dropping off early, 109.
Cæspitous, forming tufts or turf.
Calceolate, slipper-shaped.
Cálycine, calyx-like.
Calyculate, having an outer calyx or calyx-like involucre.
Calyptra, the hood of the sporange (spore-case) of a Moss.
Calyx, the outer floral envelope, 51
Cambium, 418.
Campanulate, bell-shaped, 102.
Campylótropous, 141.
Canalículate, channelled.
Canescent, grayish white.
Cápillary, capillaceous, hair-shaped.
Capitate, head-shaped, growing in close clusters or heads.
Capitulum, a little head, 361.
Cápreolate, bearing tendrils.
Capsule, 167.
Carbon, 443. Carbonic Acid, 490.
Carìna, 101. Carinate, boat-shaped, having a sharp ridge beneath.
Carpel, Carpellary, 126.
Cárpophore, 149, 151. (Fig. 177.)
Cartiláginous, firm and tough in texture, like cartilage.
Caruncle, 175.
Caryophyllaceous, 100.
Caryopsis, 153.
Catkin, 357. (See Ament.)
Caudex, 227.
Caulescent, 223. Caulis, 223.
Cauline, relating to the stem, 262.
Cellular tissue, 386. Cell, 369.
Cell-growth, 448; life, 439.
Cellular bark, 413.
Céllulose, 379.
Centrífugal inflorescence, 35
Centrípetal inflorescence, 352.
Cephalous, same as Capitate.
Cereal, relating to grains, corn, etc.
Cernuous, nodding (less inclined than pendulous).
Chaff, chaffy, 349. (See Paleaceous.)
Chalaza, 140.
Channelled, hollowed out like a gutter.
Chartàceous, with the texture of paper.
Chlòrophyl, 381, 435.
Chorisis, 76.
Ciliate, fringed with marginal hairs.
Ciënchyma, 393.
Cion or *Scion*, 218.
Cinereous, ash-gray, ash-color.
Circinate, rolled inward from the top, 255.
Circulation of the sap, 468.
Circumscíssile, 149.
Cirrhous, furnished with a tendril.
Cirrhous roots, 206.
Classes, natural, 501.
Classification, artificial, 503.
Clavate, club-shaped.
Coärctate, contracted, drawn together.
Coccus, a berry; Cocci (plural), the 1-seeded carpels of separable fruits.
Cóchleate, spiral, like the snail-shell.
Cohesion, 82.
Cohorts, 512.
Collateral, placed side by side.
Collum, 199.
Colored, of any color except green, which in botany *is not* a color, while white *is*.
Column, the combined stamens and styles.
Coma, 173.
Cómmissure, the joined faces of the carpels of the cremocarp (151).
Common, belonging alike to several.
Complete flower, 60.
Complicate, folded up upon itself.
Compound leaf, 300.
Compound flower, 348.
Compressed, flattened on the sides, 274.
Conduplicate, folded on itself lengthwise.
Cone, 169.
Confluent, uniting; same as Coherent.
Conglomerate, clustered or crowded.
Cónjugate, coupled, joined by pairs.
Connate, 311.
Connéctile, connective, 113, 114.
Connivent, converging, coming together.
Continuous, the reverse of Jointed.
Contorted, twisted, 338.
Convolute, 256, 339.
Cordate, heart-shaped, 291.
Coriaceous, leather-like, 315.
Corm, 239.
Córneous, horn-like in texture.
Corniculate, with a small horn or spur.
Corolla, 52, etc.
Córolline, pertaining to the corolla.
Coròna, crown, 435, 407.
Cortical bark, 414.
Còrymb, corym′bous, 358.
Costate, ribbed, with rib-like ridges.
Cotyledons, 180, 320.
Crassula, (a genus of plants), 63.
Cratériform, of the form of a goblet.
Creeper, Creeping stems, 231.
Cremocarp, 151.
Crenate, bordered with rounded teeth.
Crenulate, 309.
Crested or *Cristate*, with an elevated ridge
Crispate or *Crisped*, 310.
Crown of the root, 236.
Cruciform (corolla), 100.
Crude sap, 472.
Crustaceous, hard, thin, and brittle.
Cryptogamia, Cryptogams, 507.
Cùcullate, rolled up into a hood-shape.
Culm, the straw of Grasses, 224.
Cùneate, Cuneiform, wedge-shaped, 290.
Cup-shaped, 102.

Cúpule, a little cup (sc. acorn), 155.
Cúspidate, with a sharp, stiff point, 307.
Cuticle, 399.
Cyánic, blue, or any color except yellow.
Cyáthiform, cup-shaped.
Cycle (in Phyllotaxy), 263, 264.
Cyclòsis, same as Rotation, currents in the cell, 380.
Cyme, cymous, 363.
Cymbiform, boat-shaped.
Cypsela, 151.
Cytoblast, 380.

Deca (in Greek composition), ten.
Deciduous, falling at the end of the season.
Déclinate, bent downward.
Decompound, much compounded or divided, 304.
Decumbent 212. (Fig. 249.)
Decurrent, 274.
Decussate (leaves), opposite, and the pairs at right angles.
Définite, 118.
Deflexed, bent downward.
Defoliation, the casting off of leaves.
Dehíscence, 113, 148.
Deliquéscent (axis), same as Solvent, 226.
Deltoid, form of the Greek letter Δ, 288.
Dendroid, tree-like in form.
Dendron (in Greek compounds), a tree.
Dentate, 309. Denticulate, 309.
Denuded, become naked.
Depauperate, less developed than usual.
Dependent, hanging down.
Depressed, flattened from above; low.
Dextrine, 455.
Dextrórse (twining), turning to the right.
Di (in Greek numerals), two.
Diadelphous, 120.
Diagnósis, a brief statement of the distinctive character of a plant or group.
Dialypetalous, Polypetalous, 513.
Diaphanous, transparent or translucent.
Diandrous, with two stamens, 118.
Díastase, 455.
Dichotomous, forked or two-forked.
Diclínous, 67.
Dicotylédons, Dicotyledonous, 182, 284.
Dídymous, double.
Didynamous, 119.
Digitate, with several distinct leaflets palmately arranged (as in the leaf of the Horse-chestnut).
Diffuse, much divided and spreading.
Dimidiate, (anther), halved, 114.
Diœcious (flowers), 67.
Dipterous, having two wings.
Disk, 85, 362. Discoid, no rays. (Fig. 446.)
Dissected, cut into deep lobes.
Dissepiment, same as partition, 132.
Dístichous, arranged in two rows.
Distinct, separate, not united, 82.
Divaricate, wide-spread, straggling.
Divergent, spreading with a less angle.
Dorsal, on or relating to the back.
Double terms, 301.
Downy, clothed with short, weak hairs.
Drupe, 156. Drupaceous. (See Tryma.)
Drying-press, 6.
Ducts. (See Trachenchyma, 391.)
Duplicate, in pairs, double.
Duràmen, heart-wood, 410.
Dwarfing. (Fig. 250, *d*.)

E, *ex* (in composition), without; as,
Ebracteate, without bracts.
Echinate, prickly with rigid hairs.
Effete, sterile, exhausted.
Elaters, spiral, elastic threads accompanying certain spores.
Elliptic, Elliptical (leaf), 289.
Elóngated, lengthened, extended.
Emarginate, 307.
Embryo, 31, 180. Embryo sac, 142.
Embryonic vesicle, 449.
Endocarp, 156.
Endochrome, the coloring matter of plants. See Chlorophyl.
Endógenous structure, 421.
Endogens, 509, 180, 424.
Endopleùra, same as Tegmen, 172.
Endosmose, 465.
Ensiform, sword-shaped, 297.
Entire, even-edged, 308.
Ephemeral, enduring for one day.
Epi (in Greek composition), upon; as
Epicarp, 156.
Epidermis, 396.
Epígynous, upon the ovary, 97, 119.
Epipetalous, on the petals, 119.
Epíphytes, plants on other plants, 208.
Episperm, the skin of the seed.
Equitant (astraddle), 258.
Erose, eroded, as if gnawed, 310.
Etærio, 158.
Etiolated, colorless for want of light.
Exalbuminous, without albumen, 178.
Excúrrent, 226.
Exogenæ, Exogens, 182, 509.
Exogenous structure, 405.
Exosmose, flowing out, 465.
Exserted, projecting out of, or beyond.
Exstipulate, without stipules, 272.
Extra (in composition), beyond; as,
Extra-axillary, same as supra-axillary.
Extra flour (of wheat), 446.
Extrórse, turned outward, 114.

Falcate, scythe-shaped, curved.
Farinàceous, flour-like in texture.
Fárinous, mealy on the surface.
Fascicle, a bundle, 365.
Fasciculate (leaves), 262.
Feather-veined, 285.
Ferruginous, of the color of iron-rust.
Fertile (flower), seed-producing, 67.
Fertilization, etc., 447.
Fibríllæ, fibrils, 199, 428.
Filament, the stalk of a stamen, 111, 112.
Filiform, slender like a thread.
Fimbriate, fringed, having the edge bordered with slender processes.
Fistular, hollow, as the leaf of Onion.
Flabelliform, fan-shaped, 298.
Flagellíform, whip-shaped; long, taper, and supple.
Flavescent, yellowish, turning yellow.
Flexuous, zig-zag or wavy.
Floccous, with hairs in soft fleecy tufts.
Flora, (*a*) the spontaneous vegetation of a country; (*b*) a written description of the same, 23.
Floral, relating to flowers.
Floral envelopes, 50, 87.
Florets, the flowers of a compound flower, 362.
Flower, 49, etc.; origin of, 37.
Flower-bud, 244, 335, etc.
Foliaceous, leaf-like in texture or form
Foliation, the act of leafing.
Follicle, 164.
Foràmen, same as Micropyle, 140.

Free, not adherent nor adnate, 81, 94.
Fringed. (See Fimbriate.)
Frond, an organ which is both stem and leaf, as in Duckmeat, Fern.
Frondescent, bursting into leaf.
Fructification, flower and fruit as a whole.
Fruit, 38, 143; ripening of, 457.
Frutescent, shrubby, becoming shrubby.
Fulcra (roots), 206.
Fuliginous, smoky brown, blackish.
Fulvous, dull yellowish brown.
Funiculus (a little rope), 140.
Funnel-form. (See Infundibuliform), 102.
Furcate, forked. Fork-veined, 284.
Furfuràceous, scurfy.
Furrowed, marked with channels lengthwise.
Fuscous, grayish or blackish brown.
Fusiform, spindle-shaped, 203.

Galea, galeate, 103.
Gamopetalæ, Monopetalæ, 513.
Gamopetalous, with the petals united, 99.
Gamophyllous, of united leaves.
Gamosepalous, with the sepals united.
Geminate, twin, two together.
Gemmation, state of budding (Latin, *gemma*, bud).
Geniculate, bent as the knee (*genu*).
Genus, 29. Genera, 498.
Germ, the ovary. (The term is obsolete.)
Germination, 188, 454.
Gibbous, more tumid in a certain place.
Glabrous, smooth, not hairy, 312.
Gladiate, sword-shaped, ensiform.
Gland, glandular, 80, 401.
Glans, 155.
Glaucous, sea-green, bluish, usually with a *bloom*, or whitish powder.
Globous, in form nearly spherical.
Glomerate, collected into close heads.
Glómerule, 363.
Glossólogy, the same as Terminology.
Glumes, 108, 349.
Glumiferæ, 511.
Gluten, 445.
Granular, composed of grains.
Grafting. (Fig. 250, *e*.)
Graminoideæ, 515.
Grand Divisions, 65.
Growth is downward, 477.
Gymnos (a Greek prefix), naked; as,
Gymnospermous, with naked seeds.
Gymnospermæ, Gymnosperms, 510.
Gymnosporæ, Gymnospores, 517.
Gynandrous, 119.
Gynœcium, 123.
Gynobase, a process of the torus on and around which the carpels are suspended (sc. Geranium, Fig. 172).
Gynophore, a produced torus, bearing the ovary on its summit. (Fig. 112.)
Gyrate, same as Circinate, 255.
Gyrous, strongly bent to and fro.

Habit, the general aspect of a plant.
Habitat, the natural locality or place of growth of a wild plant.
Hairs, 400. Hairy, hirsute.
Halbert-shaped, hastate. (Fig. 313.)
Halved, one-half apparently deficient.
Hastate, with the base-lobes abruptly spreading, as in a halbert, 291.
Heart-shaped, 291. Heart-wood, 410.
Herb, herbaceous, 40, 41.
Herbaceous, green and cellular in texture.
Herbarium, 3.
Hesperídium, 160.
Hermaphrodite (flower), with both stamens and pistils.
Heterocéphalous, heads of two sorts in the same plant, some ♂ and some ♀.
Heterógamous, two sorts of flowers in the same head, some ♂ and some ♀.
Hexa (Greek numeral), six; as in,
Hexagonal, 6-sided or 6-angled.
Hexamerous, 6-parted.
Hexandrous, having 6 stamens.
Hilum, the eye or scar of the seed, 177.
Hirsute, hairy, with rather long hairs, 313.
Hispid, bristly with stiff hairs, 313.
Hoary, frost-colored, grayish-white.
Homógamous, head with all the flowers alike, as to the stamens and pistils.
Honey, Honey-bee, 458.
Hood. (See Calyptra, 518.)
Hooded. (See Cucullate.)
Horny, of the texture of horn.
Hortus siccus, the herbarium, 3.
Humifuse, spreading on the ground.
Hyaline, transparent, or nearly so.
Hybrid, a cross-breed between two species.
Hyperborean, inhabiting northern regions.
Hypo (in Greek compounds), under; as,
Hypocrateriform, salver-form, 102.
Hypogéan, growing under ground.
Hypogynous, 95, 119.

Imbricate, imbricated, 257, 339.
Immarginate, having no rim or border.
Immersed. (See Submersed.)
Inaxial root, 201.
Incised, divided deeply as if cut, 310.
Included, enclosed within, or shorter than, as the stamens in the corolla.
Incrassate, thickened.
Incumbent (sc. embryo), 183.
Indehiscent, not opening, 148.
Indefinite, 118.
Indigenous, native of a country.
Induplicate, 337.
Indusium, the shield of the fruit-dot (sorus) of a Fern.
Inferior, lower in position.
Inflorescence, 341, etc.
Infundibuliform, funnel-shaped, 102.
Innate (sc. anther), 114.
Inserted, Insertion, refer to the point of junction or apparent origin.
Integument, a coat or covering.
Internode, 220.
Interpetiolar, between the petioles.
Interruptedly pinnate, 302. (Fig. 358.)
Intrórse (anthers), turned inward, 114.
Involùcre, Involucel, 347.
Involute, rolled inward, 256. (Fig. 287.)
Irregular flowers, 83, 101.

Jointed, having joints, separable pieces.
Jugum, a pair; as *bijugous*, with two pairs of leaflets; *trijugous*, three pairs.

Keel, Keeled. (See Carinate.)
Kidney-shaped. (See Reniform, 295.)
Kingdoms of Nature, 12–14.

Labéllum, the odd petal of an Orchid, 101.
Labiate, lip-shaped, 103.
Lacerate, torn irregularly by deep incisions

Laciniate, slashed, with deep incisions.
Lactescent, containing lac, or milk.
Lacùnous, with large depressions or pits.
Lacustrine, growing in lakes.
Lamina, the blade of a leaf, 271.
Lanceolate, lance-shaped. (Fig. 317.)
Lanuginous, woolly, 312.
Latex, the turbid or milky juice of plants.
Laticiferous tissue. (See Cienchyma, 386.)
Latin names of plants, 25, 26.
Layer. (See Stolon, 217.)
Leaf, 271, etc.; structure of, 431, etc.
Leaf-bud, 244, etc.
Leaflet, the pieces of a compound leaf, 301.
Leaf-stems, 222.
Legume, 165.
Lens, 7.
Lenticulate, shaped like a double convex lens.
Liber, the inner bark, 412.
Lìchens, 519.
Ligneous system, 404.
Ligulate, strap-shaped, 103.
Ligule, the stipules of Grasses, 279.
Liliaceous flower, 100.
Limb, the border, 91.
Linear, long and narrow, 297.
Livid, clouded with bluish, brown, and gray.
Lobate, lobed, 294.
Loculicidal, opening into the cell, 148.
Locùsta, a spikelet of the Grasses.
Loment, a jointed legume, 165.
Lorate, thong-shaped.
Lunate, crescent-shaped.
Lyrate, pinnatifid, with the upper lobes much larger than the lower, 293.

Macros (in Greek compounds), long.
Maculate, spotted or blotched.
Male (flowers), same as Staminate.
Marcescent, withering, but persistent, 109.
Marginal, belonging to the border.
Marginate, having the border different.
Medúlla, pith. Médullary rays, 416.
Médullary sheath, 407.
Membranaceous, membranous, thin and pellucid, 315.
Merocarp, one of the carpels of a cremocarp of an Umbellifer. (Fig. 177.)
Mìcropyle, 177; same as Foramen.
Mìcroscope, 8.
Midrib, the central vein of a leaf, 282.
Midvein (used in this work), 283.
Mineral, 13.
Mitriform, formed like a conical cap.
Monos (in Greek compounds), one only; as,
Monadelphous, 120.
Monandrous, 1-stamened, 118.
Moniliform (roots), 204.
Monocarpic herbs, 42.
Monochlamydeous (flowers), 66.
Monocoty'ledons, 180, 284.
Monœcious, 67.
Monógynous, with one style, 124.
Monopetalæ. (See Gamopetalæ, 513.)
Monopetalous, 90, 91.
Monophyllous, 1-leaved.
Monosepalous, 90, 91.
Monstrous flowers, 334.
Morphology, 19; of the leaf, 271.
Mucro, a sharp, small, abrupt point.
Mucronate, 307.
Multi (in composition), many.
Multifid, cut half-way into many segments.
Muricate, bearing short, hard points.
Muriform, like a wall of mason-work.
Muscology, a treatise on Mosses.
Muticous, pointless, not pointed.
Mycelium, the thallus of the Fungi, usually concealed, 519.

Naked seeds, 147. (Fig. 166.)
Napiform (root), 203.
Natant, swimming; under water.
Naturalized, growing spontaneously but not native.
Natural Orders, 499.
Natural System, 504, 506, etc.
Nectar, honey. Nectary, 77.
Nepenthes, 322. (Fig. 391.)
Nerve, the veins (282) are sometimes so called.
Netted or *net-veined.* (See Reticulate, 284.)
Neutral flower, 68.
Nodding, nutant, the summit bent over, as in Snowdrop.
Node, a joint of the stem, 220.
Nodous, knotted, large-jointed.
Nodulous (root), 204.
Nomenclature, 25. 533, &c.
Normal, according to rule, regular.
Nuciform, nut-like.
Nucleus, kernel (sc. ovule), 140, 172.
Nut. (See Glans, 155.)

Ob (in composition), denotes inversion; as,
Obcompressed, flattened back and front.
Obcordate, 307. Oblanceolate, 290.
Oblique, unequal-sided, as the leaves of Elm.
Oblong, 289. Obovate, 290. Obtuse, 307.
Obvolute (in æstivation), 258.
Ochrea, sheathing stipules, 279.
Ochroleùcous, cream-color, pale yellow.
Octo (in Greek composition), eight.
Octandrous, having 8 stamens.
Octógynous, having 8 styles.
Offset, a short lateral shoot, 218.
Oligos (in Greek composition), few; as,
Oligandria, with few stamens.
Olivaceous, olive-green, brownish-green.
Opaque, dull, not shining.
Opercular, with a lid, 114.
Opposite, two at a node, 215, 262.
Orbicular, Orbiculate, circular, 289.
Orchidaceous, 101.
Organography, 19.
Organic world, 12.
Orthótropous (ovule), erect, 141.
Osseous, bony, as the Peach-stone.
Oval, 289. Ovate, 288.
Ovary, 125.
Ovoid, egg-shaped, as in fruits.
Ovule, the young seed, 138.

Paleæ or *Pales*, 108, 349.
Paleaceous, chaffy, having pales.
Palmi-veined, 285. Palmate, 295.
Panduriform, fiddle-shaped.
Panicle, 360. Paniculate, panicled.
Papilionaceous, 101.
Pappus, the calyx of Composites, 104.
Parallel-veined, 284.
Paráphyses, jointed threads around the antheridia of Mosses.
Parasites, 209.
Parènchyma, 387.
Parietal, on the wall (*paries*), 133.
Parted, deeply divided into parts.
Patent, wide open. Patulous, half open.
Pear-shaped, obovoid, larger above.

Pectinate, combed, finely pinnatifid.
Pedate, shaped like a bird's foot, 296.
Pedicel, Peduncle, 343.
Peltate, shield-form, 295.
Pendent, Pendulous, hanging, drooping.
Penícillate, with a tuft of hairs, as if a camel's-hair pencil.
Pente (in Greek composition), five; as,
Pentamerous, 5-parted.
Pentandrous, with 5 stamens, 118.
Pepo, a fruit like a melon, 161.
Perennial, living several years, 43.
Perfect flower, (☿) with both stamen and pistil.
Perfoliate, through the leaf, 311.
Peri (in Greek composition), around; as,
Perianth, 53, 87; forms of, 99.
Pericarp, 146; forms of, 150.
Perigynium, 107.
Perigynous, 96, 119.
Perisperm, same as Albumen, 179.
Persistent, remaining long in place, 109.
Personate, 103.
Petals, 52; forms of, 89.
Petaliferæ, 511.
Petaloid, resembling petals.
Petiole, 274. Petiolate, 271.
Petiolule, 276.
Phænogamia, 507.
Phyllodium (plural Phyllodia), 321.
Phyllotaxy, leaf-arrangement, 261.
Physics, 16.
Physiology, 436.
Phytology (Greek, *phytos*, a plant), 23.
Pileorhiza, cap of a rootlet, 428.
Pileus, cap of some Fungals.
Pilous, with erect, thin hairs, 313.
Pinnate, 302. Pinnatifid, 293.
Pistil, 56, 123.
Pitchers (leaves). (See Ascidia, 322.)
Pith, 406. Pitted cells, 376, 390.
Pitted, with depressions or excavations.
Placenta, 127; free axile, 135.
Plant defined, 14.
Plan of the Flower, 58.
Pleurénchyma, 389.
Plicate, plaited lengthwise as a fan, 254, 340.
Plumous, feathery.
Plúmule, a little plume, 31, 180.
Pollen, 111, 121. Pollen-tube, 450.
Pollinia, masses of pollen, 122.
Poly (in Greek compounds), many; as,
Polyadelphous, 120.
Poly'gamous, with some imperfect flowers.
Polypetalæ. (See Dialypetalæ, 513.)
Polypetalous, Polysepalous, 90.
Pome, a fruit like an apple, 162.
Posterior, next the axis.
Potato, manner of its growth, 238.
Precocious, flowering before the leaves.
Præfoliation, vernation, 252.
Premórse, ending abruptly, 235.
Press for drying plants, 6.
Prickles, 403.
Prímine, same as Testa, 173.
Primórdial utricle, 373.
Prismátic, prism-shaped, having several parallel, longitudinal angles.
Procumbent (stem), 212. (Fig. 248.)
Produced, extended more than usual.
Prolíferous, reproducing; as cymes from the midst of a cyme, flowers from the midst of a flower.
Protein, 440. Protoplasm, 380.
Provinces, 509.
Prúinous, powdered, as if frosted, 314.
Prúriens, causing an itching sensation.
Pseudo (in Greek composition), spurious.
Pubescent, downy with short, soft hairs.
Pubérulent, minutely downy.
Pumilous (*pumilus*), dwarfed in size.
Punctate, seeming as if perforate, or marked with minute dots.
Pungent, piercing, sharp-pointed.
Putamen, the bony nucleus of a drupe.
Pyramidal, form of a cone or pyramid.
Pyriform, of the form of a pear.
Pyxis, a pericarp with a lid, 163.

Quadri (in composition), four; as,
Quadrifoliate, four-leaved.
Quadrangular, four-angled.
Quadrijugate, with four pairs of leaflets.
Quadrilateral, four-sided.
Quinque (in composition), five.
Quinate, growing in fives, 306.
Quincuncial, 339. (Fig. 300.)
Quíntuple, five-fold.

Race (Latin, *stirps*), a permanent variety, as Red-cabbage.
Raceme, 358.
Rachis, axis of the inflorescence, 301, 343.
Radiate, diverging from a common centre.
Radiate (in the Composites), the outer row of florets ligulate. (Fig. 388.)
Radiant, outer flowers enlarged (and often neutral, Fig. 271); or (in the Composites), all the florets ligulate.
Radical, from the root, 262.
Radical (of the flower), 65.
Radicle, rootlet (of the embryo), 31, 180.
Ramial (of a branch), 262.
Raphe (of the ovule or seed), 141.
Ráphides, 383.
Rays, 359, 362.
Receptacle, 57. (See Torus.)
Recurved, bent (not rolled) backward.
Reflexed, curved backward excessively.
Refracted, bent back suddenly as if broken.
Regma, fruit as of Geranium, 168.
Regular, like parts similar, 60, *b*.
Reniform, kidney-shaped, 295.
Repand (margin), 310.
Répent, creeping (sc. stems, 232).
Respiration, 482.
Resupinate, reversed, upside down.
Reticulate, netted, 284.
Retrórse, backward, downward.
Retúse (apex), 307. (Fig. 367, *c*.)
Révolute, rolled backward, 256.
Rhizoma, Rhizome, 230, 233.
Rhombic, Rhomboidal, in the figure of a rhomb, or approaching it.
Ribs, the chief veins of a leaf, ridges.
Ringent (corolla), 103.
Root, 197. Root-stock, 233.
Rosaceous (corolla), 100.
Rostrate, beaked, with a beak.
Rosulate (leaves), arranged around the base of the stem, as the petals of a Rose, 262.
Rotate, wheel-shaped, 102.
Rotation, circulation of fluids in the cell.
Rúbicund, blushing, rosy red.
Rudiment, the beginning of a thing.
Rugous, wrinkled, 315.

Ruminated (albumen), full of chinks, as if composed of numerous folds.
Runcinate, hooked backward, 293.
Runner, 219.

Sagittate, arrow-shaped, 291.
Salver-shaped. (See Hypocrateriform, 102.)
Samàra, 154.
Sap, the crude, 472; the true, 474
Sarcocarp (of the drupe), 156.
Scabrous, rough, 312.
Scaláriform (cells), ladder-shaped, 378.
Scales, 319. Scale-stems, 79, 230.
Scandent, climbing.
Scape, 344. Scarious, 315.
Scattered, sometimes used for alternate.
Scorpoid (inflorescence), 365.
Scrobículate, pitted, with little depressions.
Sea-green, light bluish green, glaucescent.
Secúnd, all on one side, or turned one way.
Secúndine, same as Tegmen, 172.
Seed, 172. Seed-coverings, 173.
Seed, vitality of, 185; dispersion of, 186.
Semi (in composition), half; as,
Semicordate, half of cordate.
Semilunar, half-moon shaped.
Semisagittate, and Semiterete.
Sepals, 51. Sepaloid, sepal-like.
Septum, a partition between two spaces.
Septicidal (dehiscence), 148.
Septifragal (dehiscence), 148.
Seríceous, silky, 312.
Seròtinous, occurring late in the season.
Serrate, Serrulate, 309.
Sessile, sitting, not stalked, 125, 271.
Setæ, 106. Setaceous, bristle-form.
Setous, Setigirous, bearing bristles, 313.
Sheath, Sheathing, as the leaves of the Grasses, 275.
Shrub, 45.
Silique, Silicle, 166.
Siliquous, bearing siliques (as the Crucifers)
Silver-grain (of wood), 417.
Simple, of one piece, not compound.
Sinistrorse, twining from right to left.
Sinuate, 294. Slips, 218.
Solitary, growing alone, or singly.
Solvent axis, 226.
Sori, patches of fruit in ferns.
Sorosis, 171.
Spadicifloræ, 513. Spadix, 356.
Spathe, Spathaceous, 346.
Spatulate (leaf), 290.
Species, 27, 496. Specific name, 26.
Specimens (of plants) 2, 5.
Spike, Spicate, 355.
Spikelet, a little spike, as in a Grass.
Spine, a woody thorn, 327.
Spindle-shaped (root), 203. (Fig. 238.)
Spiral arrangement (of leaves), 263.
Spiral cells, or vessels, 377.
Spongelet, Spongiole, 199.
Spores, 184.
Spur, a projecting, slender appendage, 78.
Squarrous, spreading widely, as the involucral scales of some Composites.
Stages of plant life, 31.
Stamens, 55, 110. Staminate flower, 67.
Staminodia, 117.
Starch, 382.
Stem, or Ascending Axis, 211.
Sterile, not bearing seeds, 67.
Stigma, Stigmatic, 125, 129.
Stings, 402.
Stipe, the stalk of the ovary or ovaries; also, the stem of a Mushroom.
Stipels, Stipellate, 279.
Stipules, Stipulate, 272, 277.
Stolon, 217. Stoloniferous, producing stolons.
Stomata, 397, etc.
Strap-shaped, flat, narrow, and straight.
Strict, erect and very straight.
Strigous, with sharp, close, rigid hairs.
Strobile (fruit), 169.
Stróphiolate, having an appendage (strophiole or caruncle) about the hilum.
Style, 125. Styloid, style-like.
Sub (in composition), 317.
Sùberous, corky in texture.
Sub-kingdoms, 507.
Subulate, awl-shaped, 299.
Succulent, very juicy and cellular, 315.
Sucker, 216.
Suffrutéscent, woody at the base only.
Sulcate, furrowed.
Superior, 97, 98.
Superior calyx, calyx adherent to ovary
Superior ovary, calyx free from ovary.
Supérvolute, 340.
Supra-axillary, situated above the axil.
Supradecompound, very much divided.
Suspénded (ovule), 139. (Fig. 158.)
Suspensor (of the embryo). (Fig. 523.)
Sútural (dehiscence), 148.
Sword-shaped, as the vertical leaves of Iris.
Syconus, fruit, such as the Fig., 170.
Symmetry (of the flower), 60, *c*, 69.
Syn (in Greek compounds), together, union.
Syncarpium, 169.
Syngenesious, 120.
Synonyms, 538.
Systematic Botany, 492, etc.

Taper-pointed. (See Acuminate, 307.)
Tap-root, 203.
Tawny, fulvous, dull yellowish brown.
Taxónomy, the science of classification.
Tegmen, the inner seed-coat, 140, 172.
Tendril, 228, 324.
Teratólogy, 334.
Terete, cylindrical, or nearly so.
Term of plant life, 39, etc.
Terminal, situated at the end or apex.
Terminology. See Nomenclature, 533.
Ternate (leaves), in threes, 303.
Tessellated, checkered, as a pavement.
Testa, the outer seed-coat, 140, 172, 173.
Tetra (in Greek composition), four.
Tetradýnamous, 119.
Tetrágonal, with four corners.
Tetrágynous, with four pistils.
Thallogens, 426, 516.
Thallus, the cellular vegetative system of the Thallogens.
Theca, Thecæ, sporangia or spore-cases.
Thorn, 327.
Throat, orifice of a monopetalous corolla.
Thyrse, 360.
Toméntous, with short, dense, woolly hairs, 312.
Top-shaped, inversely conical.
Torus, same as Receptacle, 57, 84.
Trachénchyma, 386, 391.
Tree, 46. Transpiration, 479.
Tri (in Greek compounds), three; as,
Triadelphous, the stamens in three sets.
Triandrous, having three stamens.

Trigynous, having three styles, 124.
Tricoccous (fruit), with three 1-seeded carpels.
Trícolored (*tricolor*), with three colors.
Triennial, lasting three years.
Trifid, split half-way into three parts.
Trifoliate, with three leaflets, 303.
Trilobate, having three lobes, 296.
Trímerous, 3-parted, 65.
Tripartible, separable into three parts.
Tripli-veined, 285. (Fig. 319.)
Tríquetrous, three angled, 258, 339.
Tripinnate, thrice pinnate, 304.
Triternate, thrice ternate, 305.
True sap, 474.
Truncate, 307. (Fig. 367, *d*.)
Trunk (of a tree), 225.
Tryma, fruit, as the hickory-nut, 157.
Tube, 91. Tubular corolla, 102.
Tuber, 237. Tubercular, 204.
Tubérculate, covered with warts (tubercles).
Tumid, swollen or inflated.
Tunicate, coated, as the bulb, 242.
Turion, young shoot, as of asparagus
Typical Flower, 60. (Figs. 8–11.)

Umbel, 359. Umbellet, a partial umbel.
Umbellate, bearing umbels.
Umbílicate, with a sharp depression at end.
Unarmed, with no stings, thorns, etc.
Undershrub, a low shrub, 45.
Undulate, wavy, 310.
Unequally pinnate, 302.
Unguiculate (petal), having a claw, 88.
Uni (in compounds), one; as,
Unifóliate, with one leaf or leaflet.
Uniform, of one form.
Unilateral, 1-sided.
Unilócular, 1-celled.
Univalved, with but one valve.
Úrceolate, urn-shaped, 102.
Utricle (fruit), 152.

Vaginate, sheathing; the flattened petiole involving the stem.
Valvate, 237, 337.
Valves, Valvular, 114, 148.
Varieties, 28.
Vascular tissue, 386.
Vaulted, arched.
Vegetation, or Physiology of Plant Life, 436.
Veins, 282. Veinlets, Veinulets, 283.
Venation (of the leaf), 282.
Véntricous, swelling out on one side.
Vernal, appearing in the Spring-time
Vernation (of the leaf-bud), 252.
Ventral, belonging to the front side, *i. e.*, the side toward the axis.
Vérrucous, covered with warts (*verrucæ*).
Versatile (anther), 114.
Vertex, the summit, same as Apex.
Vértical, in the direction up and down, or parallel with the axis.
Verticillate, whorled, 215, 262.
Verticillaster, 366.
Véspertine, appearing in the evening.
Véxillary (æstivation). (Fig. 425.)
Vexíllum, banner, 101. (Figs. 59, 60.)
Villous, with long, weak hairs, 312.
Vimíneous, with long flexible shoots, osier-like.
Virgate, twiggy, long, slender.
Vine, 228.
Viscid, Viscous, sticky or glutinous.
Vitality of seeds, 185.
Vitta, Vittæ, the minute oil-tubes in the fruit-coat of the Umbelliferæ.
Volva, membrane enclosing the young Fungus.

Wedge-shaped, tapering to the base. Woody plants, 44.
Whorl, a circle of similar organs.
Witch-grass, 231.
Wood, 408. Wood-cells, 376.

Yeast-plant, 441. (Fig. 520.)

Zoology, 17.
Zoospore. (Fig. 217.)

THE

AMERICAN BOTANIST

AND

FLORIST.

PART FOURTH,

DESCRIPTIVE BOTANY;

BEING

A SIMPLE ANALYTICAL FLORA,

INCLUDING THE NATIVE AND CULTIVATED PLANTS
GROWING IN THE ATLANTIC DIVISION
OF THE UNITED STATES.

BY

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ABBREVIATIONS AND SIGNS.

§ BOTANICAL TERMS OFTEN RECURRING IN DESCRIPTIONS.

ach.	achenia.
æst.	æstivation.
alter.	alternate.
amplex.	amplexicaul.
anth.	anther.
axill.	axillary.
cal.	calyx.
caps.	capsule.
cor.	corolla.
cyp.	cypsela.
decid.	deciduous.
diam.	diameter.
ellip.	elliptical.
emarg.	emarginate.
epig.	epigynous.
f. or *ft.*	feet.
fil.	filaments.
fl.	flower; *fls.* flowers.
fr.	fruit.
gl.	glume; *gls.* glumes.
hd.	head; *hds.* heads.
hyp.	hypogynous.
imbr.	imbricate.
inf.	inferior.
invol.	involucre.
irreg.	irregular.
leg.	legume.
lf.	leaf; *lvs.* leaves.
lfts.	leaflets.
lom.	loment.
opp.	opposite.
ova.	ovary.
pap.	pappus.
ped.	peduncle.
pet.	petals.
perig.	perigynous.
perig.	perigynium.
pls.	pales.
pn.	pinnæ.
pnl.	pinnulæ.
recep.	receptacle.
reg.	regular.
rhiz.	rhizoma.
rt.	root.
sc.	scale, scales.
sds.	seeds.
seg.	segment.
sep.	sepals.
st.	stem.
sta. or *stam.*	stamens.
stig.	stigmas.
sty.	styles.
var.	variety

§ TIMES OF FLOWERING, AND LOCALITIES.

1. Names of the Months and Seasons are abbreviated in the usual manner, as, *Jan.* January; *Apr.* April; *Spr.* Spring; *Aut.* Autumn; *Sum.* Summer; &c.

2. The names of States and Territories of the U. S. are abbreviated precisely as in other works, thus:—*Ala.* Alabama; *Ark.* Arkansas; *Conn.* Connecticut, &c.

3. Sections of States are thus designated:—*N. N. Y.* Northern New York; *W. Pa.* Western Pennsylvania; *E. Fla.* East Florida; *S. Ill.* Southern Illinois, &c.

4. Names of foreign Countries:—*Eur.* Europe; *Afr.* Africa; *S. Afr.* South Africa; *Aust.* Australia; *Can.* Canada; *Mex.* Mexico; *S. Am.* South America, &c.

5. *E.* East, Eastward, indicates the States of the Atlantic seaboard from Maine to Virginia inclusive; *N-E.* or *N. Eng.* denotes the New England States.

6. *M.* is used to denote the Middle States; viz., N. Y., Penn., N. J., and Del.

7. *N.* North, Northward, indicates generally the territory north of 42° N. latitude.

8. *N-W.* Northwest, indicates Wis., Minn., and parts of Ill. and Mich.

9. *S.* South, Southward, is used to indicate the Southern States in general,—all lying south of Virginia and Kentucky.

10. *S-W.* Southwest, viz., Miss., La., Ark., and perhaps Tennessee and Texas.

11. *W.* West, denotes the States lying due north of Tennessee and Arkansas.

§ SIGNS.

①	An annual Herb.	♄	Woody Vine, evergreen.
②	A biennial Herb.	⌊	Trailing Herb, ① or ②.
♃	A perennial Herb.	⌊	Trailing Herb, ♃.
♄	An undershrub, deciduous.	♒	An aquatic Plant.
♄	An undershrub, evergreen.	☿	Flowers perfect.
♄	A Shrub, deciduous.	♂	Flowers staminate.
♄	A Shrub, evergreen.	♀	Flowers pistillate.
♄	A Tree, deciduous.	⚥	Monœcious.
♄	A Tree, evergreen.	♂ ♀	Diœcious.
♄	An herbaceous Vine, ① or ②.	♂ ☿ ♀	Polygamous.
♄	A perennial Vine, ♃.	0	Wanting, or none.
♄	Woody Vine, deciduous.	∞	Numerous, or indefinite.

§ A Plant introduced and naturalized;
† Plant cultivated for ornament; } at the end of the description.
‡ Plant cultivated for use;
o= Cotyledons accumbent;
o‖ Cotyledons incumbent; } used only in the Cruciferæ. (Page 38.)
o)) Cotyledons conduplicate;
! (Note of exclamation), used technically, denotes certainty.
? (Note of interrogation), implies doubt or uncertainty.
f (with or without a period), a foot..........
′ (a single acute accent), an inch .... } after a number.
″ (a double accent), a line =1-12 of an inch..

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§ AUTHORS' NAMES CITED IN THIS WORK.

Adans.	Adanson.	*Dill.*	Dillenius.
A. DC.	Alphonse De Candolle.	*Desv.*	Desvaux.
Ait.	Aiton.	*Dougl.*	Douglas.
All.	Allione.	*Ehrh.*	Ehrhart.
Anders.	Andersson.	*Ell.*	Elliott.
Arn.	Arnott.	*Endl.*	Endlicher.
Aub.	Aublet.	*Engel.*	Engelmann.
Bart.	Barton.	*Fisch.*	Fischer.
Bartl.	Bartling.	*F. & M.*	Fischer & Meyer.
Beauv.	Beauvois.	*Frœl.*	Frœlich.
Benth.	Bentham.	*Gært.*	Gærtner.
Bernh.	Bernhardt.	*Gmel.*	Gmelin.
Berl.	Berlandier.	*Good.*	Goodenough.
Bois.	Boissier.	*Gr.*	A. Gray.
Bong.	Bongard.	*Grev.*	Greville.
Bork.	Borkhausen.	*Griseb.*	Grisebach.
Br.	Brown.	*Gron.*	Gronovius.
Bw.	Bigelow.	*Hedw.*	Hedwig.
Cass.	Cassini.	*Hoffm.*	Hoffman.
Cav.	Cavanilles.	*Hook.*	Hooker (W. J.)
Cham.	Chamisso.	*Hook. f. (filius)*	Hooker (J. D.)
Darl.	Darlington.	*Hornem.*	Hornemann.
DC.	De Candolle.	*Huds.*	Hudson. [Kunth.
Desf.	Desfontaines.	*H. B. K.*	Humboldt, Bonpland &
Dew.	Dewey.	*Jacq.*	Jacquin.

AUTHORS' NAMES—(CONTINUED).

Juss.	JUSSIEU.
A. Juss.	Adrien Jussieu.
L. or *Linn.*	LINNÆUS.
Lag.	Lagasca.
Lam.	Lamarck.
Lamb.	Lambert.
Ledeb.	Ledebour.
Lehm.	Lehmann.
Lesq.	Lesquereux.
Lestib.	Lestibudois.
L'Her.	L'Heritier.
Lindl.	Lindley.
Mart.	Martins.
Mich.	Micheli.
Michx. or *Mx.*	Michaux.
Mx. f.	Michaux (the younger).
Mill.	Miller.
Mitch.	Mitchell.
Muhl.	Muhlenberg.
Nees.	Nees von Esenbeck.
Nutt. or *N.*	Nuttall.
Pal.	Pallas.
Pav.	Pavon.
Pers.	Persoon.
Ph.	Pursh.
Pluk.	Plukenet.
Plum.	Plumier.
Poir.	Poiret.
R. Br.	ROBERT BROWN.
Raf.	Rafinesque.
Reichenb.	Reichenbach.
Rich.	Richard.
Richn.	Richardson.
Rœm.	Rœmer.
Salisb.	Salisbury.
Schk.	Schkuhr.
Schrad.	Schrader.
Schreb.	Schreber.
Schult.	Schultes.
Schw.	Schweinitz.
Scop.	Scopoli.
Ser.	Seringe.
Soland.	Solander.
Spreng.	Sprengel.
Steud.	Steudel.
Sulliv.	Sullivant.
Thunb.	Thunberg.
Torr.	Torrey.
T. & G.	Torrey & Gray.
Tourn.	Tournefort.
Trautv.	Trautvetter.
Trin.	Trinius.
Tuckm.	Tuckerman.
Vaill.	Vaillant.
Vent.	Ventenat.
Vill.	Villars.
Wahl.	Wahlenberg.
Walp.	Walpers.
Walt.	Walter.
Wangh.	Wangenheim.
Willd.	Willdenow.
With.	Withering.
Wulf.	Wulfen.

ANALYSIS OF THE NATURAL ORDERS,

Founded on the most obvious or artificial characters: designed as a key for the ready determination of any plant, native, or naturalized, or cultivated, growing within the limits of this Flora.

PROVINCES, CLASSES, AND COHORTS.

Sub-kingdom I. The Flowering Plants..(See, next, Provinces 1, 2)...**PHÆNOGAMIA.**
Sub-kingdom II. The Flowerless Plants..(See the Provinces 3, 4)....**CRYPTOGAMIA.**
Province 1. Leaves net-veined. Flowers never completely 3-parted (mostly $\sqrt[4]{}$ and $\sqrt[5]{}$). Embryo with 2 or more cotyledons. Wood (if any) in annual circles..(See Classes 1, 2)..................*EXOGENS.*
Province 2. Leaves parallel-veined (rarely netted). Flowers 3-parted. Bark, wood, and pith commingled. Embryo with but one cotyledon..(See Classes 3, 4).......................................*ENDOGENS.*
Province 3. Stem and leaves distinguishable..(**H**)....................*ACROGENS.*
Province 4. Stem and leaves undistinguishable..(**K**).............*THALLOGENS.*
Class 1. Stigmas present. Seeds enclosed in vessels..(*).......ANGIOSPERMS.
Class 2. Stigmas 0. Seeds naked (Pines, Firs, Cedars, &c.) (**)..GYMNOSPERMS.
Class 3. Flowers without glumes. Perianth colored or green..(†)..PETALIFERÆ.
Class 4. Flowers with green alternate glumes. No perianth..(††)..GLUMIFERÆ.
* Cohort 1. Corolla with the petals distinct..(**A**).............**Polypetalæ.**
* Cohort 2. Corolla with the petals united..(**B**)............**Gamopetalæ.**
* Cohort 3. Corolla none. Calyx often none..(**C**)..................**Apetalæ.**
** Cohort 4. The cone-bearing plants (same as Class 2)..(**D**).......**Conoids.**
† Cohort 5. Fls. on a spadix, apetalous or incomplete..(**E**)...**Spadicifloræ.**
† Cohort 6. Flowers complete, with a true perianth..(**F**)........**Florideæ.**
†† Cohort 7. The Grasses, Grains, &c. (same as class 4)..(**G**)..**Graminoids.**

A. COHORT 1. POLYPETALOUS EXOGENS.

* Herbs with the leaves alternate or all radical..(12)
* Herbs with the leaves opposite on the stem..(9)
* Shrubs, trees, or undershrubs..(2)
  2 Flowers regular or nearly so..(3)
  2 Flowers irregular (or the fruit a legume) (§ 165)..(*r*)
    3 Polyandrous,—stamens 3—10 times as many as the petals..(4)
    3 Oligandrous,—stamens 1—2 times as many as the petals or fewer..(6)

4 Leaves opposite..(*s*)
4 Leaves alternate..(5)
5 Stamens on the torus or the hypogynous corolla..(*t*)
5 Stamens and petals on the calyx tube..(*v*)
6 Ovaries simple, distinct, or one only. Vines or erect shrubs..(*w*)
6 Ovary compound, and wholly adherent to the calyx..(*x*)
6 Ovary compound and free from the calyx or nearly so..(7)
7 Stamens opposite to the petals and of the same number..(*y*)
7 Stamens alternate with the petals or of a different number..(8)
8 Leaves opposite on the stems..(*z*)
8 Leaves alternate, and compound..(*yy*)
8 Leaves alternate and simple..(*zz*)
9 Polyandrous—stamens 3—10 times as many as the petals..(*m*)
9 Oligandrous,—stamens 1—2 times as many as the petals or fewer..(10)
10 Pistils separate and distinct, few or solitary, simple..(*n*)
10 Pistils united into a compound ovary free from the calyx..(11)
10 Pistils united into a compound ovary adherent to the calyx..(*o*)
11 Stamens opposite to the petals and of the same number..(*p*)
11 Stamens alternate with the petals or of a greater number..(*q*)
12 Flowers regular or nearly so. Fruit never a legume..(14)
12 Flowers irregular (rarely regular and the fruit a legume)..(13)
13 Stamens numerous, 3 or more times as many as the petals..(*k*)
13 Stamens few and definite, 4—12..(*l*)
14 Stamens (or anthers) 3—10 times as many as the petals..(15)
14 Stamens few and definite. Ovary free from the calyx..(17)
14 Stamens few and definite. Ovary adherent to the calyx..(*j*)
15 Stamens hypogynous—inserted on the torus..(16)
15 Stamens perigynous—inserted on the corolla at the base..(*c*)
15 Stamens perigynous—inserted on the calyx at the base..(*d*)
16 Pistils few or many, distinct (at least as to the styles)..(*a*)
16 Pistils (and styles if any) completely united..(*b*)
17 Pistils *one*, or indefinite and distinct, simple..(*e*)
17 Pistils definitely—* 2 united, the short styles combined into *one*..(*f*)
—* 3 or 4 united, styles or stigmas 3, 4, or 6..(*g*)
—* 5, distinct or united, with 5 distinct styles..(*h*)
—* 5, united and the styles also combined into *one*..(*i*)
a Petals 5 or more, deciduous. Leaves never peltate..................RANUNCULACEÆ. 1
a Petals 3 or numerous. Water plants with peltate leaves.... }
b Sepals 4—6, equal. Petals ∞, imbricated in the bud... } ....NYMPHÆACEÆ. 7
b Sepals 5, equal. Petals 5, imbricate. Leaves tubular...........SARRACENIACEÆ. 8
b Sepals 5, unequal. Petals 5, convolute. Flowers of 2 sorts..........CISTACEÆ. 15
b Sepals 2, with—*bb* 5 petals imbricated in the bud ..............PORTULACCACEÆ. 20
—*bb* 4 or 8 petals usually crumpled in bud..........PAPAVERACEÆ. 9
c Filaments united into a tube. Anthers 1-celled ....MALVACEÆ. 23
d Sepals 2, persistent, capping the lid of the pyxis..............PORTULACCACEÆ. 20
d Sepals 3—5, valvate in the bud. Pod long, 2-carpelled................TILIACEÆ. 25
d Sepals 3—5.—*dd* Petals imbricate in bud. Fruits simple ....ROSACEÆ. 44
—*dd* Petals convolute in bud. Fruit compound ....LOASACEÆ. 55
e Stamens opposite to the petals and of the same number. Pistil 1 only..BERBERIDACEÆ. 6
e Stamens alternate with the petals or more numerous................RANUNCULACEÆ. 1
f Stamens 6, tetradynamous. Pod 2-celled. Flowers cruciform......CRUCIFERÆ. 11
f Stamens 4—32, not tetradynamous. Pod 1-celled................CAPPARIDACEÆ. 12
g Sepals 5, unequal. Flowers perfect, numerous, minute ....CISTACEÆ. 15
g Sepals 5, equal. Flowers monœcious. Herbs woolly or scurfy......ORDER 113

g Sepals 5, or 3, equal, and the stamens twice as many..........GERANIACEÆ. 30
g Sepals 5, and the stamens (anthers) of the same number..(*gg*)
gg Sterile filam. numerous, in several whorls. Climbing..PASSIFLORACEÆ. 57
gg Sterile filaments numerous, in 5 clusters. Herb erect..SAXIFRAGACEÆ. 45
gg Sterile filaments 0..(*)
* Flowers white, racemed. Climbing..........................ORDER 106
* Flowers yellow. Plants erect ....TURNERACEÆ. 56
* Flowers cyanic. Herbs stemless..........................DROSERACEÆ. 17
h Stamens 5, alternate with the 5 petals. Styles 5 or 3. Seeds ∞......LINACEÆ. 28
h Stamens 5, opposite to the 5 petals. Styles 5, but the seed 1 ....ORDER 83
h Stamens twice as many as the petals..(*hh*)
hh Stamens 6. Leaves peltate..............................NYMPHÆACEÆ. 7
hh Stamens 6—24, distinct..............................CRASSULACEÆ. 46
hh Stamens 10, united at base..............................GERANIACEÆ. 30
i Ovary 1-celled. Leaves all radical, spinescent, irritable.......DROSERACEÆ. 17
i Ovary 3-5-celled. Leaves mostly radical, not dotted...................ORDER 73
i Ovary 3-5-celled. Leaves cauline, pinnate, dotted...................RUTACEÆ. 31
j Style 1, but the carpels as many as the petals (2—6)..................ONAGRACEÆ. 54
j Styles 3—5, ovary 3-5-celled, 3-5-seeded, wholly adherent ....ARALIACEÆ. 64
j Styles 3—8, ovary 1-celled, half-adherent. Sepals 2 ....PORTULACACEÆ. 20
j Styles 2, carpels 2, fewer than the (5) petals.—* Seeds several...SAXIFRAGACEÆ. 45
—* Seeds 2..........UMBELLIFERÆ. 63
k Ovaries many, or few, rarely 1, always simple..............RANUNCULACEÆ. 1
k Ovary compound, 3-carpelled, open before ripe.................RESEDACEÆ. 13
l Sepals (4 or 5) produced into 1 slender spur behind, petals 2 or 5....GERANIACEÆ. 30
l Sepals 2 (or vanished), petals 4 (2 pairs) with 1 or 2 blunt spurs....FUMARIACEÆ. 10
l Sepals 5, very unequal; petals 3. Stamens 6 or 8. No spur......POLYGALACEÆ. 42
l Sepals and petals each of the same number, viz...(*ll*)
ll 4, the flowers slightly irregular. Stamens 6—32. No spur..CAPPARIDACEÆ. 12
ll 4, the flowers moderately irregular. Stamens 8. A vine ......SAPINDACEÆ. 37
ll 5, with 5 stamens, and generally a blunt spur.....................VIOLACEÆ. 14
ll 5, with 10 or more stamens. No spur. Fruit a legume........LEGUMINOSÆ. 43
m Pistils many, entirely distinct, simple.........................RANUNCULACEÆ. 1
m Pistils 3—5, united more or less completely...........................HYPERICACEÆ. 16
m Pistils 5—10, united, with sessile stigmas and many petals...........FICOIDEÆ. 61
n Pistil solitary, simple. Petals 6—9. Stamens 12—18 ....BERBERIDACEÆ. 6
n Pistils 3 or more, distinct, simple. Flowers all symmetrical..CRASSULACEÆ. 46
n Pistils 2, consolidated with the 5 stamens. Juice milky.............ORDER 100
o Carpels as many as the sepals..(*nn*)
o Carpels fewer in number than the sepals..(*oo*)
nn Anthers opening at the top. Flowers 4-parted....MELASTOMACEÆ. 52
nn Anthers opening laterally. Styles united into 1......ONAGRACEÆ. 54
nn Anthers opening laterally. Styles or stigmas distinct..HALORAGEÆ. 48
oo Each carpel ∞-seeded. Styles 2 ....SAXIFRAGACEÆ. 45
oo Each carpel 1-seeded. Styles 2 or 3................ARALIACEÆ. 64
oo Each carpel 1-seeded. Style 1 (double)..............CORNACEÆ. 65
p Style 3-cleft at the summit. Flowers 5-parted......PORTULACACEÆ. 20
p Style and stigma 1, undivided. Flowers 7-parted.............ORDER 81
q Leaves pinnate, with interpetiolar stipules...................ZYGOPHYLLACEÆ. 29
q Leaves simple, toothed or lobed. Flowers cruciform. Stamens 6....CRUCIFERÆ. 11
q Leaves simple, toothed or lobed. Flowers 5-merous. Stamens 10..GERANIACEÆ. 30
q Leaves simple, entire..(*qq*)
qq Petals and stamens on the throat of the calyx.................LYTHRACEÆ. 53
qq Petals on the torus..(*)

* Flowers irregular, unsymmetrical........................POLYGALACEÆ. 42
* Flowers regular, 2-(or 3-)parted throughout................ELATINACEÆ. 18
* Flowers regular, 5-parted. Leaves punctate ....HYPERICACEÆ. 16
* Flowers regular, 5-parted. Leaves dotless...........CARYOPHYLLACEÆ. 19
r Pistil a simple carpel, becoming a legume. Stamens 10—100......LEGUMINOSÆ. 43
r Pistil compound, viz..(*rr*)
rr 3-carpelled. Flowers perfect. Leaves digitate...............SAPINDACEÆ. 37
rr 3-carpelled. Flowers monœcious. Cultivated...............BEGONIACEÆ. 59
rr 5-carpelled.—* Stipules present. Cultivated.................GERANIACEÆ. 30
—* Stipules none. Native.................................ORDER 73
s Stamens on the receptacle, in several sets. Leaves dotted........HYPERICACEÆ. 16
s Stamens on the receptacle, in 1 set. Lvs. fleshy. (S. Fla)...*Clusia.* GUTTIFERÆ. (21)
Stamens on the calyx..(*ss*)
ss Sepals, petals, and ovaries indefinite.......................CALYCANTHACEÆ. 3
ss Sepals, &c., definite. Leaves dotted, entire...................MYRTACEÆ. 51
ss Sepals, &c., definite. Leaves dotless, entire ....LYTHRACEÆ. 53
ss Sepals, &c., definite. Leaves dotless, subdentate..........SAXIFRAGACEÆ. 45
t Filaments united into 1 set (monadelphous). Petals convolute..(*u*)
t Filaments united into 1 or several sets. Petals imbricate..(*uu*)
t Filaments distinct..(*tt*)
tt Petals 6, valvate, lurid. Erect shrubs...........................ANONACEÆ. 4
tt Petals 3—9, imbricate. Trees or shrubs........................MAGNOLIACEÆ. 2
tt Petals 4—8, imbricate. Climbing or trailing..............MENISPERMACEÆ. 5
tt Petals 4, imbricated. Shrubs, S...........................CAPPARIDACEÆ. 12
u Anthers 1-celled. Sepals valvate in the bud................MALVACEÆ. 23
u Anthers 2-celled. Sepals valvate. Handsome tree......STERCULIACEÆ. 24
u Anthers 2-celled. Sepals imbricate. A large tree in S. Fla..CANELLACEÆ. (22)
uu Leaves punctate with pellucid dots, jointed to stalk..AURANTIACEÆ. 32
uu Leaves opaque..(*)
* Sepals valvate. Flowers small ....TILIACEÆ. 25
* Sepals imbricate. Flowers large.................CAMELLIACEÆ. 26
v Style 1, with many stigmas. Green fleshy shrubs................CACTACEÆ. 60
v Styles several or 1, each with 1 stigma. Woody trees or shrubs...ROSACEÆ. 44
v Style 1, with 1 stigma. Stam. in 5 sets, long, red, very showy...MYRTACEÆ. 51
w Trailing vines, with crimson fls. Ovaries ∞, in a little spike...MAGNOLIACEÆ. 2
w Climbing vines, with white-greenish fls. Ova. 2—6, capitate...MENISPERMACEÆ. 5
w Erect shrubs, with yellow flowers, 6-parted. Pistil only 1.......BERBERIDACEÆ. 6
w Erect shrubs (S. Fla.) with yellow fls. Pistils 5, 2-ovuled, 1-sded..SURIANACEÆ. (62)
w Trees, with greenish fls.,—* and pinnate lvs. Pist. 3-5, 1-ovuled..SIMARUBACEÆ. 34
—* and simple leaves. Follicles 3—5...STERCULIACEÆ. 24
x Flowers 4-parted. Stamens 8. (Fls. red or roseate, drooping)..ONAGRACEÆ. 54
x Flowers 4-parted. Sta. 8. Fls. light yellow. Coasts, S. Fla..RHIZOPORACEÆ. (49)
x Flowers 4-parted. Stamens 4. Flowers whitish, in cymes......CORNACEÆ. 65
x Flowers 5-parted..(*xx*)
xx Ovary 5-carpelled, 5-styled, 5-seeded.......................ARALIACEÆ. 64
xx Ovary 5-carpelled, 1-styled, 1-seeded. S. Fla...........COMBRETACEÆ. 50
xx Ovary 2-4-carpelled, ∞-seeded........................SAXIFRAGACEÆ. 45
y Leaves opposite. Stem climbing with tendrils or radicles..VITACEÆ. 41
y Lvs. alternate. St. erect, or climbing without tendrils..RHAMNACEÆ. 40
z Leaves simple. Stamens 5. Carpels 3—5, style 1, short..........CELASTRACEÆ. 38
z Leaves simple. Sta. 10. Carpels and sty. 3. S. Fla..*Byrsonima.* MALPIGHIACEÆ. (39)
z Leaves pinnate, or palmately lobed. Carpels and styles 2 or 3......SAPINDACEÆ. 37
z Leaves pinnate..(*)
* Stamens 10. Small tree with blue flowers. S. Fla........ZYGOPHYLLACEÆ. 29
* Stamens 2. Carpels 1 or 2. Style 1.................................ORDER 101

* Stamens 8. Carpel and style 1..............................BURSERACEÆ. 35
yy Filaments 10, united into a tube or cup. Flowers in panicles.......MELIACEÆ. 27
yy Filaments 6—10, distinct. Flowers small, white, in racemes.....BURSERACEÆ. 35
yy Filaments 6—10, distinct. Fls. small, white or hoary, paniculate..SAPINDACEÆ. 37
yy Filaments 5, distinct..(*)
* Leaves pellucid-punctate ....RUTACEÆ. 31
* Leaves opaque. Ovary 1-celled, 1-seeded...............ANACARDIACEÆ. 36
zz Petals 4, yellow, strap-shaped, appearing in late Autumn.......HAMAMELACEÆ. 47
zz Petals 4—7, cyanic (rarely yellow), rounded or short..(†)
† Style 0, the stigmas 1, 4, or 5, sessile. Drupe 4-6-seeded..............ORDER 74
† Styles (or stigmas) 3, but the drupe only 1-seeded...........ANACARDIACEÆ. 36
† Styles 3, capsule many-sded. Lvs. minute and scale-form..TAMARISCINEÆ. 24 *bis*
† Style 1,..(‡)
‡ Capsule 3-seeded. Seeds with a scarlet aril...............CELASTRACEÆ. 38
‡ Caps. ∞-seeded. Clusters fragrant. Lvs. evergreen. Cult...PITTOSPORACEÆ.
‡ Capsule with few or many seeds. Native shrubs................ORDER 73

B. COHORT 2. GAMOPETALOUS EXOGENS.

§ Stamens (6—∞) more numerous than the lobes of the corolla..(9)
§ Stamens (2—12) fewer than the corolla lobes or of the same number..(2)
2 Ovary inferior,=adherent to the tube of the calyx..(3)
2 Ovary superior,=free from the tube of the calyx..(4)
3 Stamens cohering by their anthers..(*c*)
3 Stamens entirely distinct..(*d*)
4 Flowers regular and the stamens symmetrical..(5)
4 Flowers regular and the stamens reduced to 2 or 4..(*n*)
4 Flowers irregular. Stamens (except in 3 or 4 species) unsymmetrical..(*o*)
5 Stamens opposite to the lobes of the corolla (and free)..(*e*)
5 Stamens alternate with the corolla lobes (rarely connate)..(6)
6 Shrubs, trees, with the carpels or stigmas 3—6..(*f*)
6 Herbs 1-10-carpelled, or shrubs 2-carpelled..(7)
7 Ovary 1, deeply 4-parted or 4-partible, forming 4 achenia..(*g*)
7 Ovaries 2, distinct (often covered by the stamens)..(*h*)
7 Ovary 1, compound,—* one-celled..(*k*)
—* two-six-celled..(*m*)
9 Flowers irregular (rarely regular and the fruit a legume)..(*a*)
9 Flowers regular and the fruit never a legume (§ 165)..(*b*)
a Flowers 1- or 2-sided, with 1 or 2 blunt spurs. Stamens 6, in 2 sets...ORDER 10
a Flowers 1-sided, no spur..(*)
* Leaves compound. Fruit a legume ....ORDER 43
* Leaves simple. Fruit 2-celled, 2-seeded..........................ORDER 42
* Leaves simple. Fruit 5-celled..................................ERICACEÆ. 73
b Corolla lobes convolute in bud. Stamens ∞, united into 1 tube.....ORDER 23
b Corolla lobes imbricate in bud. Stamens ∞, in 1 or several sets ....ORDER 26
b Corolla lobes imbricate..(*u*)
u Stamens 10—24. Styles 5—12......................................ORDER 46
u Stamens 5—10. Style 1. Capsule 5-celled....................ERICACEÆ. 73
u Stamens 8—∞. Style 1. Nut 1-5-seeded................STYRACACEÆ. 76
u Stamens 8. Styles 4. Berry 8-seeded ....EBENACEÆ. 77

c Flowers in a compact head surrounded by an involucre..............COMPOSITÆ. 70
c Flowers separate, irregular, perfect. Plants erect..................LOBELIACEÆ. 71
c Flowers separate, regular, imperfect. Weak vines......................ORDER 58
d Leaves alternate. Flowers 5-parted, regular, separate.....CAMPANULACEÆ. 72
d Leaves alternate. Fls. irregular, 5-parted. S. Fla..*Scævola*. GOODENIACEÆ. (71½)
d Leaves opposite, with stipules between, or verticillate...........RUBIACEÆ. 67
d Leaves opposite. Stipules none..(*v*)
v Stamens 5—4. Ovaries 2–5-celled......................CAPRIFOLIACEÆ. 66
v Stamens 2—3. Ovaries 1-celled.........................VALERIANACEÆ. 68
v Stamens 4. Flowers capitate ....DIPSACEÆ. 69
e Herbs. Ovary with 5 styles and but 1 seed................PLUMBAGINACEÆ. 83
e Herbs. Ovary with 1 style and many seeds..................PRIMULACEÆ. 81
e Trees or shrubs. Appendages between the stamens...........SAPOTACEÆ. 78
e Trees or shrubs. No appendages between the stam. S. Fla..MYRSINACEÆ. (79)
f Leaves opposite. Style 1. Drupe 4-seeded. Herbs, shrubs..VERBENACEÆ. 90
f Leaves alternate..(*w*)
w Drupe 4–6-seeded. Shrubs, trees...................AQUIFOLIACEÆ. 74
w Drupe 1-seeded. Thorny. S. Fla...........*Ximenia*. OLACACEÆ. (80)
w Capsule 2–5-celled, ∞-seeded ....ERICACEÆ. 73
g Herbs, with alternate leaves, generally rough-hairy.....BORRAGINACEÆ. 92
h Stigmas connate. Flower bud convolute ....APOCYNACEÆ. 99
h Stigmas connate. Flower bud valvate ...........ASCLEPIADACEÆ. 100
h Stigmas distinct. Flowers minute, yellow........CONVOLVULACEÆ. 95
k Ovule solitary. Corolla limb entire............................ORDER 103
k Ovules several. Leaves cleft and lobed .............HYDROPHYLLACEÆ. 93
k Ovules several. Leaves or leaflets entire..(*x*)
x Flowers not spicate..............................GENTIANACEÆ. 97
x Flowers spicate................ }
m Leaves all radical. Flowers spiked ... } ..............PLANTAGINACEÆ. 82
m Leaves opposite. Ovary 2-celled.........................LOGANIACEÆ. 98
m Leaves alternate..(*y*)
m Leaves opposite. Ovary 3-celled. Not twining.. }
y Ovary 3-celled. Not twining.............. } ....POLEMONIACEÆ. 94
y Ovary 2-celled. Twining.....................CONVOLVULACEÆ. 95
y Ovary 2-celled, 4-seeded. Erect..................BORRAGINACEÆ. 92
y Ovary 2-celled, ∞-seeded.—*z* Styles 2.......HYDROPHYLLACEÆ. 93
—*z* Style 1...............SOLANACEÆ. 96
n Stamens 4. Ova. 4-(rarely 1- or 2-)celled, with as many sds..VERBENACEÆ.90
n Stamens 2. Ovary 2-celled, forming 1 or 2 seeds.............OLEACEÆ. 101
o Ovary deeply 4-parted, forming 4 (or fewer) achenia..(*p*)
o Ovary entire, 4-ovuled, 4- or fewer-seeded. Leaves opposite..VERBENACEÆ. 90
o Ovary entire, ∞-ovuled, ∞- or several-seeded..(*s*)
p Leaves opposite. Stems square. Stamens 2—4...............LABIATÆ. 91
p Leaves alternate. Stems round. Stamens 5...........BORRAGINACEÆ. 92
s Trees or climbing shrubs. Seeds winged.......................BIGNONIACEÆ. 86
s Trees. Seeds not winged .....SCROPHUL. 88. Erect shrubs .....ERICACEÆ. 73
Herbs.—*ss* Leafless parasites. Native. Ovary 1-celled.....OROBANCHACEÆ. 85
—*ss* Leafy at base or in the water. Flowers spurred..LENTIBULACEÆ. 84
—*ss* Leafy. Flowers large, spurless. Ovary 1-celled...GESNERIACEÆ. 87
—*ss* Leafy. Spurless. Fruit 4- or 5-celled ....§ BIGNONIACEÆ. 86
—*ss* Leafy. Fruit 2-celled..(*t*)
t Seeds on hooks or cups. Corolla mostly convolute ....ACANTHACEÆ. 89
t Seeds without hooks. Corolla imbricated in the bud.....SCROPHULARIACEÆ. 88
t Seeds without hooks. Corolla mostly plicate...................SOLANACEÆ. 96

C. Cohort 3. APETALOUS EXOGENS.

¶ Plants herbaceous, the flowers not in aments (except Humulus, 115)..(2)
¶ Plants woody,—shrubs or trees..(8)
 2 Flowers with a regular calyx (or a calyx-like involucre)..(3)
 2 Flowers achlamydeous,—neither calyx nor corolla..(*k*)
  3 Calyx tube adherent to the ovary, limb lobed, toothed, or entire..(9)
  3 Calyx free from the ovary, sometimes enclosing it..(4)
 4 Ovaries several, entirely distinct, each 1-styled, 1-ovuled..(*g*)
 4 Ovary 1 only, simple or compound..(5)
  5 Style or stigma 1 only..(6)
  5 Styles or stigmas 2—12..(7)
   6 Ovary 1-ovuled, bearing but 1 seed..(*c*)
   6 Ovary many-ovuled, bearing many seeds..(*d*)
  7 Ovary 1–3-ovuled, 1–3-seeded..(*e*)
  7 Ovary 4– ∞-ovuled, 4– ∞-seeded..(*h*)
 8 Flowers not in aments, with the leaves opposite..(*n*)
 8 Flowers not in aments, with the leaves alternate..(10)
 8 Flowers imperfect, the sterile only in aments..(*v*)
 8 Flowers imperfect, both the fertile and sterile in aments..(*x*)
  9 Stamens 1—12, as many or twice as many as the stigmas..(*a*)
  9 Stamens 2—10, not symmetrical with the 1 or 2 stigmas..(*b*)
 10 Style or stigma 1. Fruit 1-seeded..(11)
 10 Styles or stigmas 2..(*s*)
 10 Styles or stigmas 3—9..(*t*)
  11 Calyx free from the ovary..(*p*)
  11 Calyx adherent to the ovary..(*r*)
   a Stigmas and cells of the ovary 1—4. Stamens 1—8..............Order 48
   a Stigmas and cells of the ovary 6. Stamens 6 or 12...Aristolochiaceæ. 102
    b Styles 2. Ovary many-seeded. Stamens 8—10..............Order 45
    b Style 1. Ovary 1- or 2-seeded. Stamens 5...........Santalaceæ. 110
   c Flowers perfect. Calyx 4-lobed. Stamens 1—4..................Order 47
   c Flowers perfect. Calyx entire, funnel-shaped, colored..Nyctaginaceæ. 101
   c Flowers diclinous. Calyx 4-5-parted, green................Urticaceæ. 115
    d Stamens 4, opposite to the 4 sepals. Leaves numerous......Order 53
    d Stamens 4, opposite to the 4 sepals. Leaves about 6........Order 145
    d Stamens 5, alternate with the 5 sepals.......................Order 81
    d Stamens ∞. Leaves large and showy. Cultivated...........Order 9
   e Fruit 3-(rarely 6-)seeded, with 3 (often cleft) styles.....Euphorbiaceæ. 113
   e Fruit 1-seeded. Stipules sheathing the stems...........Polygonaceæ. 104
   e Fruit 1-celled, mostly 1-seeded. Stipules none..(*f*)
    f Calyx with scarious bractlets outside...............Amarantaceæ. 107
    f Calyx naked (double in 1 genus). Lvs. alternate..Chenopodiaceæ. 106
    f Calyx naked. Leaves opposite.............................Order 19
   g Stamens hypogynous—on the torus..............................Order 1
   g Stamens perigynous—on the calyx.............................Order 44
    h Leaves opposite. Fruit circumscissile, a pyxis.............Order 61
    h Leaves opposite. Fruit 4–5-valved, a capsule................Order 19
    h Leaves alternate..(*i*)
     i Fruit 5-horned, 5-celled, a capsule.......................Order 46
     i Fruit a fleshy 4–10-seeded berry..............Phytolaccaceæ. 105
     i Fruit circumscissile, a utricle..................Amarantaceæ. 107
   k Flowers on a spadix with a spathe. Monocotyledons..........Order 130
   k Flowers in a long naked spike. Stamens 6 or 7..........Saururaceæ. 115
   k Flowers solitary, axillary, minute. Aquatic plants..(*m*)

m Stamen 1, styles 2. Leaves opposite.............Callitrichaceæ. 116
m Stamens 2, styles 2. Leaves alternate, dissected..Podostemiaceæ. 117
m Sta. 12–24, style 1. Lvs. verticillate, dissected..Ceratophyllaceæ. 118
n Fruit a double samara (2-winged)..................................Order 37
n Fruit a single samara (1-winged), or a drupe. Stamens 2........Order 101
n Fruit not winged,—*o* 3-seeded. Stamens 4............Euphorbiaceæ. 113
—*o* 1-seeded. Stamens 4 or 8..........Eleagnaceæ. 112
—*o* 1-seeded. Stamens 3. Parasites..Loranthaceæ. 109
p Anthers opening by valves. Calyx colored.................Lauraceæ. 108
p Anthers opening by slits.—*q* Calyx colored. Stam. 8....Thymelaceæ. 111
—*q* Calyx greenish; racemed...........Order 37
—*q* Cal. green; spiked. S. Fla..Combretaceæ. (50)
r Ovary and seed only 1, in the juicy drupe. Trees.............Order 65
r Ovaries 2—4, seed 1. Fruit a drupe or nut. Shrubs...Santalaceæ. 110
s Stamens numerous..Order 47
s Stamens as many as the calyx lobes...................§ 1. Urticaceæ. 114
t Leaves pinnate. Pistils 5, scarcely united....................Order 31
t Leaves simple, linear, evergreen. Shrubs heath-like..Empetraceæ. 119
t Leaves simple, expanded. Fls. 3-parted. Fruit dry..Euphorbiaceæ. 113
t Leaves simple, expanded. Fls. 4- or 5-parted. Fruit fleshy....Order 40
v Nut drupaceous, naked. Leaves pinnate...............Juglandaceæ. 121
v Nut or nuts in a cup or involucre. Leaves simple........Cupuliferæ. 122
x Fruit fleshy, aggregated (sorosis). Juice (or sap) milky...§ 2. Urticaceæ. 114
x Fruit dry. Plants with a watery juice or sap..(*y*)
y Aments globular, racemed. Nutlets 2-celled, woolly.............Order 65
y Aments globular, solitary. Nutlets 1-celled, 1-seeded....Platanaceæ. 120
y Aments cylindrical or oblong..(*z*)
z Ovary 2-celled, 2-ovuled, 1-seeded. Fruit often winged..Betulaceæ. 123
z Ovary 1-celled, 1-seeded. Fruit often fleshy...........Myricaceæ. 124
z Ovary many-ovuled, many-seeded. Seeds comous......Salicaceæ. 125

D. Cohort 4. THE CONOIDS.

* Leaves pinnate. Stem simple, palm-like. Sterile flowers in cones....Cycadaceæ. 126
* Leaves simple. Stem branching. Fertile flowers in cones.............Coniferæ. 127
* Leaves simple. Stem branching. Fertile flowers solitary...............Taxaceæ. 128

E. Cohort 5. THE SPADICEOUS ENDOGENS.

¶ Trees or shrubs with palmi-cleft leaves all from one terminal bud, and a branching "spadix" from a spathe........................ } ...Palmaceæ. 129
¶ Herbs with simple, rarely ternate leaves. Spadix simple..(2)
2 Plants frond-like, minute, floating loose on the water...............Lemnaceæ. 131
2 Plants with stem and leaves, rooting and fixed..(3)
3 Spadix evident, in a spathe or on a scape ....Araceæ. 130
3 Spadix obscure or spike-like. Stems leafy..(4)
4 Flowers with no perianth, densely spicate or capitate......Typhaceæ. 132
4 Flowers with a perianth or not. Plants submersed.......Naiadaceæ. 133

F. Cohort 6. FLORIDEÆ, or FLOWERING ENDOGENS.

¶ Flowers (not on a spadix) in a small, dense, involucrate head..(*o*)
¶ Flowers (not on a spadix) solitary, racemed, spicate, &c..(2)
  2 Perianth tube adherent to the ovary wholly or partly..(4)
  2 Perianth free from the ovary..(3)
    3 Petals and sepals differently colored (except in Medeola, 147)..(*e*)
    3 Petals and sepals similarly colored..(5)
      4 Flowers imperfect (♂ ♀ or ♂ ☿ ♀)..(*a*)
      4 Flowers perfect..(*b*)
        5 Leaves net-veined, broad..(*k*)
        5 Leaves parallel-veined..(6)
          6 Styles and often the stigmas also united into one..(*m*)
          6 Styles and stigmas 3, distinct..(*n*)
  a Low aquatic herbs.......................................Hydrocharidaceæ. 135
  a Climbing shrubby vines...Dioscoriaceæ. 143
    b Anthers 1 or 2, on the pistil (gynandrous).....................Orchidaceæ. 137
    b Anthers 1 or 5, free from the pistil. Leaves ample...........Scitamineæ. 138
    b Anthers 3 or 6..(*c*)
      c Perianth woolly or mealy outside. Ovary half free....Hæmadoraceæ. 141
      c Perianth glabrous outside..(*d*)
        d Anthers 3, opening crosswise, inward.............Burmanniaceæ. 136
        d Anthers 3, opening lengthwise, outward................Iridaceæ. 142
        d Anthers 6, opening inward ....Amaryllidaceæ. 139
  e Pistils 3—∞, distinct, forming achenia in fruit...................Alismaceæ. 134
  e Pistils 3 only, more or less united..(*g*)
    g Leaves verticillate, in 1 or 2 whorls. Stigmas 3..............Trilliaceæ. 146
    g Leaves alternate..(*h*)
      h Stigmas 3. Plants with dry leaves, often epiphytes.....Bromeliaceæ. 140
      h Stigmas united into 1...................................Commelynaceæ. 151
    k Flowers perfect, 4-parted....................................Roxburghiaceæ. 145
    k Flowers diœcious, 6-parted...Smilaceæ. 144
      m Flowers colored, regular. Stamens 6 (4 in one species).....Liliaceæ. 147
      m Flowers colored, irregular or else triandrous.........Pontederiaceæ. 149
      m Flowers greenish, glume-like or scarious..................Juncaceæ. 150
    n Leaves rush-like. Ovary of 3 1-seeded carpels.........}
    n Leaves linear, lanceolate, &c. Ovary 6-∞-seeded...} ..Melanthaceæ. 148
      o Petals yellow, small but showy. Plant acaulescent........Xyridaceæ. 152
      o Petals white, minute, fringed. Plant acaulescent....Eriocaulonaceæ. 154

G. Cohort 7. GRAMINOIDEÆ, or GRASS-LIKE ENDOGENS.

¶ Flowers with 6 bracts in 2 whorls (sepals and petals). Culms solid ....Order 150
¶ Flower with a single bract (glume). Culm solid, sheaths entire.......Cyperaceæ. 153
¶ Flower with several bracts (glumes and pales). Culm hollow. }
  Sheaths split on one side. Ovary 1-seeded. Styles 2...... } ....Gramineæ. 155

H. Province, ACROGENS.

§ Plants with well-developed foliage..(¶)
  ¶ Leaves few, mostly ample and from subterranean rhizomes..(*a*)

a Fruit borne on the leaves which are often more or less contracted...FILICES. 159
a Fruit borne at the base of the radical, entire or lobed leaves..MARSILEACEÆ. 156
¶ Leaves numerous, small, mostly spirally imbricated on the stem..(*b*)
b Fruit axillary, sessile, opening by a slit....................LYCOPODIACEÆ. 157
b Fruit mostly terminal and usually stalked, opening by a lid............MUSCI.*
¶ Leaves numerous, small, imbricated on the stem in 2 rows. }
§ Plants with the leaves and stem confounded, thallus-like....... } ....HEPATICÆ.*
§ Plants with verticillate branches instead of leaves..(*c*)
c Fruit in terminal spikes, and of one kind only...............EQUISETACEÆ. 158
c Fruit lateral, scattered on the branches, and of two kinds.........CHARACEÆ.*

K. PROVINCE, THALLOGENS

Plants aquatic, with a colored thallus. Fruit immersed in the frond..............ALGÆ.*
Plants on dry rocks, logs, or bark of trees, thalloid or granular.................LICHENS.*
Plants growing on decaying organisms. Thallus cotton-like, the fruit very different, all without chlorophyll or starch.......................... }....FUNGI.*

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* These Orders, the lower Cryptogams, are omitted in this work.

PART FOURTH.

DESCRIPTIVE BOTANY, OR PHYTOLOGY,

COMPRISING A TABULAR FLORA OF

THE UNITED STATES AND CANADA

(WITHIN THE LIMITS STATED IN THE PREFACE).

Sub-Kingdom, PHÆNOGAMIA, the Flowering Plants, having stamens and pistils, producing seeds with an embryo. (For sub-kingdom Cryptogamia, see page 360.)

Province, EXOGENÆ, the Dicotyledonous Plants. Stems composed of bark, wood, and pith, exogenous (§ 405) in growth. Leaves mostly net-veined. Flowers 5-parted or 4-parted, rarely in 3s. Embryo with 2 or more opposite cotyledons. (Province Endogenæ, p. 316.)

Class I, ANGIOSPERMÆ. Pistils complete, with stigma and ovary, the latter enclosing the ovules, and in fruit enclosing the seeds. Cotyledons only 2. (Class II, Gymnospermæ, p. 311.)

Cohort 1, DIALYPETALÆ, the Polypetalous Exogens. Flowers having a double perianth, both calyx and corolla, the latter composed of distinct petals. (Cohort 2, p. 144.)

Order I. RANUNCULACEÆ. Crowfoots.

Herbs (or woody climbers) with a colorless, acrid juice. *Leaves* mostly divided, exstipulate, with half-clasping petioles. *Sepals* 3–15, green or petaloid. *Petals* 3–15, distinct, sometimes irregular or none. *Stamens* hypogynous, indefinite. *Ovaries* many or few, distinct, 1 — ∞-ovuled. *Fruit* either

dry achenia, or follicles, or baccate, 1—∞-seeded. *Seeds* anatropous, embryo straight in horny albumen.—Abounding in cool regions.
Illustrated in figs. 33, 39, 83, 84, 109, 127, 132, 159, 155, 156, 212, 234, etc.

TRIBES AND GENERA.

Sepals valvate in the bud. Achenia tailed. (Tribe I.)
Sepals imbricated in the bud.—*a* Ovaries 1-seeded, acheniate. (2)
—*a* Ovaries 2—∞ -seeded (3)
2 Corolla 0, or undistinguishable from the colored calyx. (Tribe II., *b*)
2 Corolla and calyx distinct either in color or form. (Tribe III., *c*)
3 Sepals as permanent as the stamens. Fruit follicular. (Tribe IV., *d*)
3 Sepals caducous sooner than the stamens. (Tribe V., *g*)
3 Sepals persistent with the follicular fruit. (Tribe VI.)

I. CLEMATIDEÆ.—Petals 0, or stamen-like. Leaves all opposite.		CLEMATIS.	1
II. ANEMONEÆ.	*b* Sepals deciduous with the stamens. Stem-leaves opposite.	ANEMONE.	2
	b Sepals deciduous with the stamens. Leaves all radical.	HEPATICA.	3
	b Sepals caducous.—Leaves ternately compound.	THALICTRUM.	4
	—Leaves palmate, simple. Flowers ☿.	TRAUTVETTERIA.	5
III. RANUNCULEÆ.	*c* Sepals not appendaged. Petals red or yellow, no scale.	ADONIS.	6
	c Sepals not appendaged. Petals xanthic, a scale at base.	RANUNCULUS.	7
	c Sepals appendaged. Plant minute. Leaves radical.	MYOSURUS.	8
IV. HELLEBOREÆ.—*d* Perianth regular. (*e*)			
	e Petals 0. Sepals white.	ISOPYRUM.	9
	e Petals 0. Sepals 6–9, yellow.	CALTHA.	10
	e Petals slender, tubular at apex. Roots yellow.	COPTIS.	11
	e Petals minute, tubular at base, 1-lipped.	TROLLIUS.	12
	e Petals small, tubular, 2-lipped. Sepals persistent.	HELLEBORUS.	13
	e Petals small, concave, 2-lobed. Fls. racemed. Rt. yel.	ZANTHORHIZA.	14
	e Petals larger than the colored sepals, 3-lobed.	NIGELLA.	15
	e Petals larger than the colored sepals, spur-like, equal.	AQUILEGIA.	16
	—*d* Perianth irregular. (*f*)		
	f Upper sepal spurred, containing two spurred petals.	DELPHINIUM.	17
	f Upper sepal hooded, covering two deformed petals.	ACONITUM.	18
V. CIMICIFUGEÆ.	*g* Flowers numerous, in long, spicate racemes.	CIMICIFUGA.	19
	g Flowers many, in short racemes. Fruit baccate.	ACTÆA.	20
	g Flower 1 only. Plant 2-leaved. Berry compound.	HYDRASTIS.	21
VI. PÆONIÆ.—Petals plane, large, showy. Disk sheathing the follicles.		PÆONIA.	22

1. CLEMATIS, L. VIRGIN'S BOWER. Calyx of 4 (4—9 in the exotics) colored sepals, in æstivation valvate-induplicate. Petals 0, or if present, more like sterile filaments. Stamens shorter than the sepals, the outer or all sometimes sterile. Ovaries ∞ in a head. Achenia caudate with the lengthened plumous or pubescent styles ♃. ♄ Somewhat woody, climbing by the clasping petioles. Leaves opposite. Fig. 359.

SUBGENERA AND SPECIES.

§ ATRÁGENE. Outer stamens petal-like. Lvs. verticillate. Fls. solitary. Vine...No. 1
§ CLEMATIS *proper*. Petals none. Leaves opposite...(*)
* Erect herbs. Lvs. simple. Fls. solitary, large, terminal, nodding. May..Nos. 9–11
* Climbing.—*a* Fls. panicled, white, often diclinous, sepals thin.............Nos. 2–4
—*a* Fls. solitary, nodding,—*b* bell-shaped, pale bluish purple...Nos. 5, 6
—*b* ovoid, dark purple ....Nos. 7, 8
Exotic.—* Flowers in clusters, white. Leaves pinnate.................... ....Nos. 12, 13
* Flowers single, large.—*x* Leaves simple. Sepals 4........ ....Nos. 14, 15
—*x* Leaves compound. Sepals 4, open ......Nos. 16, 17
—*x* Leaves compound. Sepals 6—9, open...Nos. 18, 19

1 **C. verticillàris** DC. Lvs. in whorls of 4, each ternate, and 2 large purple fls. at each node. Highland woods, Me. to Ga., W. to Rky. Mts. 15f. May, June. Rare.

2 **C. Virginiàna** L. Glabrous; lvs. ternate, lfts. lobed and cut-dentate; achenia long, plumed, in feathery tufts. Thickets, Can. to Ga., W. to Mo. 15f. Aug. †

3 **C. Catesbyàna** Ph. Pubescent; lvs. biternate, lfts. ovate, mostly 3-lobed, lobes entire; ach. short-plumed; sep. small, linear-oblong. Coast, S. Car. to Fla. 12f. July.

4 **C. holoserícea** Ph. Silky-pubescent; lvs. ternate, lfts. lance-oblong, entire; fls. in small corymbous clusters; sep. linear; ach. long-plumed. Carolina. Diœcious.

5 **C. crispa** L. Lvs. ternate, pinnate, or decompound, lfts. varying from ovate to lanceolate, and linear, acute, thin, smooth; ach. tails short, pubescent. Va. to Ga. and La. Lfts. 3—15. Fls. elegant, 15″ long. (C. Walteri Ph., C. cylindrica Sims, &c.)

6 **C. reticulàta** Walt. Lvs. ternate or pinnate, lfts. 3—7, obtuse at each end, at length rigid and prominently veined, often lobed; tails silky. Fla. Sep. 12—15″ long.

7 **C. Viórna** L. *Leather-flower.* Lvs. pinnate, lfts. ovate, acute, smooth; sep. lance-ovate, the cuspidate points reflexed; ach. tails long, plumous. Woods, O. to Ga. 10—15f. Peduncles with a pair of simple leaves. Summer. Rare.

8 **C. Pítcheri** T. & G. Leaves pinnate, leaflets coriaceous, roughened with the netted veins; sepals lance-ovate; ach. tails short, pubescent. Ill., Iowa, to Ark.

9 **C. ochroleùca** Ait. Lvs. silky-pubescent beneath, ovate, entire; sep. silky, yellowish within; ach. plumes long, straw-color. ♃ Woods, L. I. to Ga. Rare. 1f.

10 **C. ovàta** Ph. Leaves glabrous, glaucous beneath, broad-ovate; flower on a short peduncle, purple; sepals ovate, pointed. ♃ N. Car. to Fla. 1—2f. Leaves entire.

11 **C. Baldwínii** T. & G. Lvs. oblong to lance-linear, the lower 3-lobed or cleft; flower on a long peduncle, purplish. ♃ Fla. 1—2f. Plumous tails 2′ long.

12 **C.** ERÉCTA. Stem 3f, weak, inclining; lfts. lance-ovate. ♃ Europe. August.

13 **C.** FLÁMMULA. Climbing 12—20f; leaflets oval to oblong-linear, often lobed, acute, smooth; clusters terminal, fragrant. From France. August, September.

14 **C.** INTEGRIFÒLIA. Upright; lvs. lance., entire, smooth; fls. nodding, blue. Eur. 2f.

15 **C.** CIRRHÒSA. Climbing; lvs. ovate, subcordate, toothed; fls. fragrant, white. Eur.

16 **C.** VITICELLA. Lfts. 3—15, ovate or oval, entire; sep. obovate, purp., 15″. Eur. Sum.

17 **C.** GRAVÈOLENS. Lfts. 3—5, lanceolate, acute; sep. oblanceolate, ylw., 9″. Thibet.

18 **C.** FLÓRIDA. Lvs. ternate and bitern.; sep. ovate, pointed, wh. or purplish. Japan.
β. SIEBÓLDTII. Fls. 4′ broad, creamy-white and purple, double. Splendid.

19 **C.** CŒRÙLEA. Lvs. ternate, hairy; fls. very large; sep. lance-ovate, blue, &c. Japan.
β. AZUREA-GRANDIFLORA. Flowers 5—7′ broad, azure, or lilac-blue. July.

2. ANEMÒNE, L. WIND-FLOWER. Involucre remote from the flower, of 3 divided leaves, calyx regular, of 3—15 colored sepals. Corolla 0. Ovaries ∞, free, collected into a roundish or oblong head. Achenia with a short, rarely a lengthened beak. Seeds suspended. ♃ Lvs. radical. Stem leaves 2 or 3, opposite, forming the involucre. Figs. 116, 176.

§ PULSATÍLLA. Carpels many (50—75), with long plumous tails. One large flower..No. 1
§ ANEMONÁNTHEA. Carpels hairy, but neither tailed nor grooved...(*a*)
  a Pistils many (50—70) in a head, densely matted with wool in fruit...(*b*)
  a Pistils fewer (15—20) in a head, merely pubescent in fruit..................Nos. 2, 3
    b Stem leaves (involucre) sessile, with a single flower..................Nos. 4—6
    b Stem leaves (involucre) petiolate, with 2 or 3 flowers..................Nos. 7—9
§ SYNDÉSMON. Carpels few, not caudate, glabrous and grooved....................No. 10
Exotic, cultivated species..........Nos. 11—13

1 **A. patens** L. β. ***Nuttalliàna.*** *Pasque-flower.* Clothed with long silky hairs; lvs. many-cleft, with linear segments, developed after the large spreading pale-purple flower. Dry hills, Ill., Wisc. to Dak. (Matthews). 1′—1f. Sepals 5 or 6, 1′. April.

2 **A. nemoròsa** L. Smooth, 1-flowered; leaves of the invol. 3, petiolate, 3-5-parted, segm. cleft and lobed. Copses, com., 6—9′. Fl. white, purple outside. April, May.

3 **A. Pennsylvánica** L. Hairy, 1-, finally 2- or 3-flowered; leaves of the invol. sessile, large, veiny, 3-parted, acuminate-lobed and toothed. Prairies, Can. to Penn., W. to the Miss. 12—20′. Flowers pure white. June—August.

4 **A. Caroliniàna** Walt. Lvs. 3-parted into cuneate-linear, twice trifid segm.; involucre similarly cleft half-way; sepals obtuse, 15—20; carpels in an oblong head. Car. to Ill., and Nebr. 6—10′. Flower white-purple, pretty, fragrant. April, May.

5 **A. heterophýlla** Nutt. Lvs. of roundish-oval, crenate segments, invol. linear-cleft to the base; sepals acute, 5—13; carpels in a cylindrical head. Ga. to La. and Ark. 8—16′. Flower white-green, scentless. March, April.—Varies toward No. 4.

6 **A. parviflòra** Mx. Leaves of involucre 2, 3-cleft, segments cuneiform, 3-cleft, crenate-lobed; sepals 5 or 6; carpels in a globular head. L. Sup., and N. 3—12′. White.

7 **A. multífida** DC. *Red Anémone.* Involucre short-petioled; lateral peduncles involucellate; head of carpels oval. N. Vt. to L. Sup. Rare. Red-white. 1f. June.

8 **A. Virginiàna** L. Invol. long-petioled; lateral ped. involucellate; head of carp. oblong. Can. to Car. 2—3f. Fls. white-green, on long stalks. Sepals 5. Jn.—Aug.

9 **A. cylíndrica** Gray. Invol. long-petioled; peduncles all naked, long; head of carpels cylindrical. N. H., Mass., to Iowa. Silky pubescent. 2f. White-green. May.

10 **A. thalictroìdes** L. *Rue Anémone.* Glabrous, slender; invol. of 2 sessile biternate (apparently of 6-petioled ternate) lvs., lfts. 3-lobed; fls. umbelled; sep. 5—10. Woods, Can. to Ga., W. to Iowa. 6–10′. Root tuberous. Fls. white-purp., 1′. Apr., May.

11 **A.** CORONÀRIA. Lvs. multifid, segm. linear; sep. 6, roundish, close. Levant. May.

12 **A.** HORTÉNSIS. Lvs. 3-parted, with cuneate cut-dentate lobes; invol. sessile; sep. 10—12, oblong. Italy. Varieties are double, semidouble, red, white, blue, &c. May.

13 **A.** JAPÓNICA. Lvs. of the involucre and involucels broadly 3-5-lobed; fls. many, 18″ broad, white and red; sepals in 2 rows, roundish, widely spreading. Autumn.

3. **HEPÁTICA,** Dill. LIVERLEAF. LIVERWORT. Invol. of 3 entire, ovate, obtuse bracts, resembling a calyx, situated a little below the flower. Calyx of 5—9 petaloid sepals, disposed in 2 or 3 rows. Cor. 0. Achenia awnless. ♃ Lvs. all radical, cordate, 3-lobed, thick, evergreen. Flowers single, on hairy scapes, appearing in early Spring before the new leaves. Figs. 332, 431. Cultivated as a border flower.

1 **H. tríloba** Chaix. *Round-lobed L.* Lvs. with 3 round-obtuse lobes; bracts of the invol. obtuse. Woods, N. Eng. Scapes and leaf-stalks 3—4′. Fls. blue, varying to white, neat and elegant, becoming double in cultivation.

2 **H. acutíloba** DC. *Acute-leaved L.* Lvs. with 3 acute lobes, bracts of the invol. acute. Borders of woods, Vt. to Wis. 4—5′. Flowers violet-blue to rose-purple.

4. **THALÍCTRUM**, Tourn. MEADOW RUE. Calyx colored, of 4—5 concave, caducous sepals. Petals 0. Filam. dilated upward, longer than the sepals. Ov. 4—15. Ach. stiped or sessile, ribbed or inflated, short-beaked. ♃ Lvs. ternately compounded, with stalked leaflets. Lfts. 3–7-lobed. Flowers paniculate, often diclinous, of no beauty.

* Flowers diœcious, in loose panicles. Styles slender. Achenia sessile or nearly so, ovoid, conspicuously angled and grooved..............................Nos. 1—3

* Fls. perfect, few in the corymbed clusters. Sty. short. Ach. long-stipitate....No. 4

1 **T. dioìcum** L. Slender, glaucous, glabrous (1—2f); leaves all petiolate (with the general petiole); fls. in slender panicles, purplish or greenish; fil. capillary, drooping, achenia about 8. Hilly woods: common. Leaflets thin, 5-7-lobed. April, May.

2 **T. cornùti** L. Stouter, tall (3—4f), smoothish; stem leaves sessile (no common petiole); lfts. thickish, veiny, with acutish lobes; anthers on white erect filaments; achenia about 12, substipitate. Meadows. Leaflets 3-lobed. July, August.

3 T. purpuráscens L. Stem tall (3—6f!), purple; stem leaves sessile, or nearly so, lfts. thick and firm, with rolled edges, pale and often glandular-downy beneath; anth. linear, drooping; achenia sessile, as long as their stigmas. Hilly woods. June, July.

4 T. clavàtum DC. Slender (1—2f); lvs. petiolate, biternate, lfts. obtusely lobed; ach. curved, 5—10, short-pointed, long-stiped. Mts., N. Car. to Ala. White. July.

5. **TRAUTVETTÈRIA,** Fisch. & Meyer. Sep. 4 or 5, colored, caducous. Pet. 0. Filam. petaloid. Ach. 15—20 in a head, membranous, inflated, angular, tipped with the short hooked style. ♃ Leaves palmately lobed, alternate. Flowers corymbous, white.

T. palmàta F. & M.—Prairies and woods. Can. to Va., W. to the Cascade Mts.! 3—5f. Radical lvs. large, 5-9-lobed; stem lvs. few; corymb terminal. July, August.

6. **ADÒNIS,** L. PHEASANT'S-EYE. Sepals 5. Petals 5—15, the claw naked (no scale). Achenia spiked on the torus, ovate, pointed with the persistent style. Herbs with dissected leaves, and bright, showy flowers.

1 A. VERNÀLIS. Fls. cup-shaped, yellow, of 10—12 oblong petals. ♃ Eur. 6—10′. May.

2 A. AUTUMNÀLIS. Fls. globular, red, of 5—8 concave petals. ① Eur. 1f. Aug., Sept.

7. **RANÚNCULUS,** L. CROWFOOT. BUTTERCUPS. Sepals 5, ovate. Pet. 5—10, roundish, shining, each with a honey-scale (Fig. 39) or pore at the base inside. Ach. flattened, pointed, crowded in a head. ♃ ① Leaves alternate. Flowers generally yellow. Figs. 39, 83, 84, 109, 118, 159, 212, 234, 415, 416.

§ BATRÁCHIUM. Petals white, with a yellow, naked honey-pore on the claw. Seeds (achenia) transversely wrinkled. Leaves multifid, in water............................No. 1
§ RANÚNCULUS. Petals (yellow) with a honey-scale on the claw of each...(*)
  * Achenia rough with points or prickles. Leaves palmate-parted. ①......Nos. 18, 19
  * Achenia smooth,—*x* numerous, in an oblong head. Wet places...........Nos. 7—9
    —*x* many, in a rounded head...(*a*)
    a Leaves many-cleft, in thread-like segments, under water.................No. 2
    a Leaves all undivided, entire or toothed. In wet places...............Nos. 3—6
    a Lvs., at least the lowest ones, undivided, merely lobed or crenate...Nos. 10—12
    a Leaves all deeply divided, the lower—*y* pinnately with stalked lfts..Nos. 13—15
      —*y* palmately with sessile lfts...Nos. 16, 17
      Exotic, cultivated.....Nos. 20, 21

1 R. aquátilis L. β. ***trichophýllus*** Chaix. *White Water-C.* Leaves all filiformly dissected and submersed. ♃ In slow streams. July, Aug. (R. divaricatus Schrank.)
γ. ***heterophýllus*** DC. Upper leaves floating, 3-5-lobed. Near Boston (Bigelow, now lost). In Idaho (Walker). Submersed leaves as in β.

2 R. multífidus Ph. *Yellow Water-C.* Floating or creeping; some of the leaves emersed, reniform, 3-5-parted, and cleft. Sepals reflexed; carpels with a straight beak, heads globous. Ponds and muddy shores, 1—2—3f. Petals 5—8. May, June.

3 R. Flámmula L. *Spearwort.* Stem erect from an ascending base; lvs. all lance-shaped, on sheathing petioles; ach. roundish, twice longer than its beak. Can. to Car., W. to Oreg. 8—16′. Lvs. 3—6′. Fls. showy. Sum. (R. alismæfolius Geyer.)

4 R. reptans L. Stem creeping, geniculate, rooting, filiform; nodes 1-flowered; lvs. linear or oblong; pet. 5—10, bright. N. Eng. to Oreg. Delicate. Fls. 4″. Lvs. 1′. Jl.

5 R. pusíllus Poir. Erect; lvs. all petiolate, lower ovate, upper lance-linear; pet. 3 (1—5) short; stam. 8—10; carp. scarcely pointed. N. Y. to Ga., and La. 6—12′. May.

6 R. oblongifòlius Ell. Erect, diffuse; lvs. lance-ovate and lanceolate, all stalked; pet. 5, stam. 20; carp. pointless. Ill. to Tex. June. 2f. (R. Texensis Eng.)

7 **R. Cymbalària** Ph. St. filiform, creeping, rooting; lvs. reniform-cordate, crenate-dentate above; scapes 1-5-flowered (2—6′); petals 5—8, oval; carpels striate, beak short, uncinate. Brackish shores, N. J. to Dak. (Matthews). June.

8 **R. sceleràtus** Ph. Erect, smooth; root lvs. 3-lobed, lower stem lvs. 3-parted and cut-crenate; fls. small; carp. pointless. Wet. Can. to Ga. 1f. Head 3″. Jn.—Aug.

9 **R. Pennsylvánicus** L. Very hirsute; leaves ternate, lfts. subpetiolate, deeply 3-lobed and cut; sep. reflexed, longer than the 5 pet.; carp. beaked. Wet. 2f. Jn.-Aug.

10 **R. abortìvus** L. Very smooth; root lvs. roundish cordate, crenate, petiolate; upper leaves in 3 linear segments; sepals reflexed, longer than the very short petals. Woods: common. 8—16′. Flowers very small. Pretty. May, June.

11 **R. recurvàtus** Poir. Hirsute with thin spreading hairs; leaves all similarly 3-parted, lobes incised; sepals recurved, longer than the petals; carpels with a hooked beak. Woods. 1f. Pale green. Flowers small. May—July.

12 **R. rhomboìdeus** Goldie. Hairy, much branched; root lvs. rhomboid-ovate, crenate-dentate, long-stalked; sep. spreading, shorter than the petals; achenia smooth, with a very short beak. Prairies, Ill., Mich., Wis., Can. 6—10′. May.

13 **R. fasciculàtis** Muhl. *Early C.* Erect; root a fascicle of fleshy fibres; root leaves appearing pinnate; peduncles terete; carpels scarcely margined, beak slender. Rocky hills. 5—10′. Hairs silky. Flowers 1′ broad. April, May.

14 **R. repens** L. Root fibrous; later stems creeping, long; root leaves ternate, with stalked leaflets; pedicels furrowed; carpels broadly margined and stout-beaked. Moist shades. 1—3f. Flowers showy. Hairy or smooth. Very variable.

15 **R. bulbòsus** L. Hairy; stem erect, bulbous at the base; root leaves ternate, segments petiolate, incised; ped. furrowed; sepals reflexed. Fields, N. Eng., N. Y. 1f. May, Jn. The cup-shaped flower, golden-yellow, is larger and handsomer than No. 17.

16 **R. palmàtus** Ell. Erect; leaves 3-5-cleft, with the sinus at the base closed, segments all sessile, cut-dentate, or lobed; carpels margined and straight-beaked. Pine woods, Car. to Fla. 1f—18′. Pubescent. Flowers small (7″). April, May.

17 **R. acris** L. *Buttercups.* Erect; leaves deeply trifid, the base segments divaricate, all laciniate and sessile; pedicels terete; carpels with a short recurved beak. Common in N. Eng. and Can. Hairy. 2f. Flowers large, 1′ broad. June—Sept.

18 **R. muricàtus** L. Glabrous; carpels aculeate, strongly margined, ending in a stout recurved beak. Va. to La., also in Cal. 1f. Leaves lobed and toothed.

19 **R. parviflòrus** L. Villous; carpels rounded, granulated, tipped with a very short beak. Va. to La. 6—12′. Flowers small. March, April.

20 **R.** ASIÁTICUS. *Garden Ranunculus.* Erect; leaves ternate or biternate, segments incised or lobed; head of carpels cylindric. Levant. 1f. Flowers variegated endlessly, of every form and hue. Not hardy.

21 **R.** ACONITIFÒLIUS. Branching and many-flowered; leaves palmately 3-7-parted and cut-toothed, the upper sessile, with lance-linear lobes; calyx appressed; petals pure white. From Europe. A fine old border flower, deep green, the flowers often double.

8. **MYOSÙRUS,** Dill. MOUSE-TAIL. Sep. 5, produced downward at base below their insertion. Petals 5, with slender, tubular claws. Stamens 5—20. Achenia spicate on the spindle-shaped torus. ① Leaves linear, entire, radical. Scapes 1-flowered. Fig. 132.

M. mínimus L. Low grounds, Ill. to La., W. to Oreg.! A curious little plant, remarkable for its tall torus, covered with numerous blunt carpels. Pet. yellow. Apr.

9. **ISOPỲRUM,** L. FALSE RUE ANEMONE. Sep. 4, petaloid, deciduous. Pet. 5, small, tubular, sometimes 0. Follicles 3 or more, subsessile, pointed with the style, with 2 or more seeds. Delicate herbs. Leaves ternately compound, lfts. 2-3-lobed. Flowers pedunculate, white. Fig. 33.

I. biternàtum T. & G. Glabrous, erect; stems clustered; pet. 0; follicles 3–6, strongly veined, 2-seeded. ♃ Damp shades, O. to Ark. 4—10′. May. Very pretty.

10. CALTHA, L. Cowslip. Marsh Marigold. Sepals 5—9, petaloid. Petals 0. Follicles 5—10, oblong, pointless, spreading, ∞-seeded. ♃ Very glabrous, aquatic.

C. palùstris L. Stem hollow, thick; leaves thickish, large, orbicular or reniform, crenate or entire; flowers yellow. Wet meadows. 1f. Flowers 18″ broad. May.

11. COPTIS, Salisb. Gold-thread. Sepals 5—7, oblong, concave, colored, deciduous. Petals 5—7, clavate, tubular at apex. Follicles 5—10, stipitate, rostrate, divergent, 4–6-seeded. ♃ Low, smooth, with radical leaves and flowers on a scape.

C. trifòlia Salisb. Leaves 3-foliate, leaflets sessile; scapes 1-flowered; pet. small and stamen-like; rhizome thread-like, of a golden yellow. Penn. to Can. 3—4′. Flowers white, the small yellow petals inconspicuous. Root bitter, tonic.

12. TRÓLLIUS, L. Globe-flower. Sep. 5—15, petaloid. Pet. 5—25, small and inconspicuous, linear, tubular at base. Stam. and pistils ∞; follicles ∞-seeded. ♃ Smooth, with palmately-parted leaves.

1 **T. laxus** Salisb. Sepals 5, rounded, spreading; petals shorter than the stamens, orange-colored. Swamps, Can. to Penn. and Del. Rare. 1f. Flowers 18″ broad; sepals yellow, greenish outside. Pods about 10. June.

2 **T.** Europæus. Sepals 15, incurved, concave; petals 5—10, as long as the stamens. From Europe. 2f. Yellow. June, July. Hardy, and very ornamental.

3 **T.** Asiáticus. Sepals 10, partly open; petals 10, longer than the stamens. From Asia. 2f, with ample foliage and orange-red flowers, varying to yellow. June, July.

13. HELLÉBORUS, L. Hellebore. Sepals 5, mostly greenish, persistent. Petals 8—10, very short, tubular, 2-lipped. Stigmas 3—10, orbicular. Follicles ∞-seeded. ♃ Leaves coriaceous, palmately or pedately divided. Flowers large, nodding. Fig. 494.

1 **H. vìridis** L. Glabrous; rt. lvs. pedate, cauline palmate, sessile; fls. often in pairs; sepals round-ovate, acute, pale yellowish-green, spreading 1′. From Eur. 1f. § Apr.

2 **H.** niger. *Christmas Rose.* Root lvs. pedate; scape naked, bracted, 1- or 2-flowered; fls. 2′ broad, white, pink, and finally green. In England, it flowers about *Christmas.* 1f. Leaves thick, evergreen, and shining. March, April.

14. ZANTHORHÌZA, L. Yellow-root. Sep. 5. Pet. 5, of 2 roundish lobes raised on a claw. Stam. and pistils 5—10. Ova. 2- or 3-ovuled, follicles mostly 1-seeded, seed suspended. ♄ Roots and bark yellow and bitter. Leaves pinnate. Racemes axillary. Flowers dark purple.

Z. apiifòlia L'Her.—River banks, N. Y. to Ga. Lvs. clustered at top of the short, thick stem; leaflets 5, sessile, incised; racemes compound. Fls. 3″ broad. Apr.

15. NIGÉLLA, L. Fennel-flower. Sep. 5, petaloid. Pet. 5, 3-cleft. Pistils 5, becoming as many follicles which are distinct or united. ① Lvs. 1–2-pinnately divided into linear-subulate segments. Fig. 343.

1 **N.** Damascèna. *Ragged Lady.* Flowers in a leafy involucre; carpels united into a roundish, tumid capsule. From Spain. 2f. Flowers light blue. June—Aug.

2 **N.** satìva. *Nutmeg-flower.* Hairy; flowers not involucrate; carpels distinct. Egypt.

16. AQUILÈGIA, L. COLUMBINE. Sepals 5, equal, ovate, spreading, colored. Petals 5, all alike, horn-shaped, attached by the margin of the dilated mouth, produced to a honey spur behind. Pistils 5, follicles 5, many-seeded. ♃ Leaves bi-triternate, leaflets lobed. Flowers large and handsome, nodding. April—June. Figs. 127, 155, 156.

* Flowers scarlet, red, and orange-colored. Spurs of the petals straight....Nos. 1—3
* Flowers blue and white. Spurs straight in No. 4,....incurved in........ Nos. 5—7

1 **A. Canadénsis** L. Very smooth, 1—2f; lfts. 3—9, round-wedge-form; fls. nodding, yellow within; stamens and styles yellow, exserted. Rocky woods, and cultivated.

2 **A.** SKÍNNERI. Like No. 1, but with larger fls., the spurs and sep. greenish. Mexico.

3 **A.** FORMÒSA. Sepals and spurs much longer than the petals; sta. included. Kamt.

4 **A.** CŒRÙLEA. Like No. 3, but the fls. all larger, blue and white, 2½′ long. R. Mts.

5 **A.** VULGÀRIS. *Common C.* Spurs little longer than the limb; stam. scarcely exserted. Europe.—Varies to purple, and white; also with double flowers,—spur within spur.

6 **A.** SIBÍRICA. Stem smooth, nearly naked, few-flwd., 1½f; spur some longer than the white-tipped limb; sepals very obtuse, violet. Very fine and choice like the next.

7 **A.** GLANDULÒSA. Glandular-hairy above; stems bracted, 1-2-flwd., 1f; spurs half as long as the snow-white limb; sepals sky-blue, acute, 1′ long. From Siberia.

17. DELPHÍNIUM, L. LARKSPUR. Flowers irregular. Sepals 5, colored, the upper one spurred behind. Petals 4, very unequal, the two upper spurred and enclosed in the spurred sepal. Styles and follicles 1—5. Handsome herbs, with palmately-divided leaves. Flowers of the cyanic series, never yellow. Figs. 26, 87, 88, 126.

§ CONSÓLIDA. Petals united into one piece. Style and follicle 1. ①........Nos. 4, 5
§ DELPHINÁSTRUM. Pet. 4, distinct. Pistils and follicles 2—5, mostly 3. ♃...(*a*)
a Species indigenous, Penn., South and West, often cultivated..........Nos. 1—3
a Species exotic, cultivated, natives of Siberia and California..........Nos. 6—9

1 **D. tricórne** Mx. Low (6—12′); leaf-lobes linear; raceme few-flwd., loose; spur ascending, straight; pods recurved. Uplands. Fls. 6—12, blue, white. April, May.

2 **D. azùreum** Mx. Erect (1—2f); leaf-lobes all narrow-linear; raceme strict; spur ascending; pods erect. Wis. to Ark. Flowers ∞, azure, or light blue. May, June.

3 **D. exaltàtum** L. Tall (2—4f); leaf-lobes wedge-lanceolate; rac. strict, ∞-flowered; spur straight; pods erect. Mich. to Car. Rac. panicled; fls. purp.-blue. July.

4 **D. Consólida** L. *Field L.* Branching; lvs. finely cut; fls. loosely racemed, scattered; pod smooth. Fields, gardens. 3—4f. Fls. blue, variable. Aug., Sept. § Eur.

5 **D.** AJÀCIS. *Rocket L.* Subsimple; leaves finely cut; flowers many, in crowded racemes; pod pubescent. Alps. 1—2f. Flowers pink, rose, white, often double.

6 **D.** ELÀTUM. *Bee L.* Pubescent, tall (5—6f); leaf-segments 5, cuneate, cut-trifid; rac. long; spur curved downward; petals hairy, resembling a bee inside the flower. Blue.

7 **D.** GRANDIFLÒRUM. Lvs. 5-7-parted, segm. 3-cleft, linear, distant; petals shorter than the calyx. Stem 2f. Flowers large, dark or purplish blue, often double.

8 **D.** CHILÁNTHUM. Leaf-lobes 3 or 5, oblong, acuminate; pods pubescent; sep. shorter than the calyx; spur decurved. Siberia. 2f. Dark blue.—Var. FORMÒSUM is very beautiful, blooming from July to Nov., the large flowers light blue, white at centre.

9 **D.** CARDINÀLE. Glabrous; lvs. 3-parted, segm. cleft into long acute lobes; fls. scarlet, large; spur longer than the sepals. California. 1—2f. Splendid, but not hardy.

18. ACONÌTUM, Tourn. WOLFBANE. MONK'S-HOOD. Sep. 5, irregular, colored, upper one (helmet) vaulted. Petals 2 (the 3 lower minute or 0), spurred at apex, on long claws, concealed beneath the helmet. Sty. and pods 3—5. ♃ Lvs. palmate. Fls. racemed or panicled. Poisonous. Fig. 29.

1 **A. uncinàtum** L. Erect, weak (2f); leaf-divisions rhomb-lanceolate, cut-dentate; helmet obtusely conical, erect, short-beaked in front; flowers blue. Mts., N.Y. to Ga. Leaves thick, 4—5′ wide. Branches divergent. Panicle loose. June, July.

2 **A. reclinàtum** Gray. Trailing (3—7f); leaf-divisions wedge-shaped, cut or lobed; helmet elongated-conical, with a straight beak; flowers white. Mountains, Va.

3 **A.** Napéllus. *Common Monk's-hood*, or *Aconite*. Smooth and rigidly erect, 3f; lvs. 5-parted, and cut into broad-linear segm. channelled above; fls. densely racemed, dark blue (or white in β. album), the hood broader than high. From Europe. Summer.

4 **A.** Anthòra. Erect (1—2f); lvs. multifid with narrowly linear segm.; fls. panicled, large (as in the others), purple with yellow; hood rather high-crowned. Europe.

5 **A.** Japónicum. Smoothish, veiny, 3—5f; fls. deep blue, in panicled spikes; hood or helmet very high-crowned and inflated, with a thickened inflexed spur. Japan.

6 **A.** variegàtum. Erect (3—4f), very smooth; leaves with rhomb-ovate divisions; fls. loosely panicled, blue, edged with white; helmet crown high, curved forward. Jn. +

19. CIMICÍFUGA, L. Bugbane. Sepals 4 or 5, caducous. Petals stamen-like, 1—8, clawed, 2-horned at apex; follicles 1—8, dry, dehiscent. Leaves ternately decompound. Flowers white, in long racemes.

§ Macròtis. Pistil 1, with a broad stigma and seeds in two rows................No. 1
§ Cimicifuga. Pistils 3—8, with a minute stigma, seeds in one row.........Nos. 2, 3

1 **C. racemòsa** Ell. *Black Snakeroot.* Tall (5—8f); rac. very long (1—3f), plume-like with its innumerable white stamens. Woods, Can. to Ga. Fetid. July.

2 **C. Americàna** Mx. Leaves triternate, thin; racemes slender, panicled; ovaries mostly 5, pods obovate, stiped. Mountains, Penn. to N. Car. 3—4f. Aug., Sept.

3 **C. cordifòlia** Ph. Leaves biternate, thick; racemes panicled, slender; ovaries 2 or 3; pods oblong, sessile. Mountains, N. Car. 3—4f. Sept.

20. ACTÆA, L. Baneberry. Sep. 4 or 5, caducous. Pet. 4—8, spatulate, long-clawed. Fil. slender. Ov. 1, with a sessile, 2-lobed stigma. Berry globous, with a lateral furrow, 1-celled, ∞-seeded. ♃ Lvs. ternately divided. Lfts. ovate, cut-lobed and toothed. Fls. white, in a short raceme.

A. spicàta L. β. ***rubra*** Mx. Raceme hemispherical; petals acute; pedicels slender; berries red, ovoid-oblong. Woods, Can. to Penn., and W. 1½—2f. Lvs. ample. Raceme as broad as long. May. These plants are often described as species.

γ. ***alba*** Mx. Raceme oblong; petals truncate; berries white, on thick stalks. Can. to Ga. Common. White berries sometimes occur with slender pedicels, and *vice versa.* Foliage exactly as in β. *Var. a.* is European.

21. HYDRÁSTIS, L. Turmeric-root. Sepals 3, petaloid, caducous. Pet. 0. Ovaries 12 or more, becoming a baccate fruit, resembling a raspberry; acines 1- or 2-seeded. Roots yellow, a tangled mass, sending up a single radical leaf and a stem which is 2-leaved and 1-flowered. Fig. 101.

H. Canadénsis L.—In damp woods, Can. to Car. and Ky. 1f. Leaves palmately 3-5-lobed. Flower terminal, reddish-white. Fruit crimson. June.

22. PÆÒNIA, L. Pæony. Sepals 5, unequal, leafy, persistent. Petals 5. Ovaries 3—5, surrounded by an annular disk. Follicles ∞-seeded. ♃ Root fasciculate. Leaves ternately or pinnately compound. Flowers large, terminal, solitary. Figs. 36, 241.

§ Stems shrubby, perennial. Ovaries and pods 5. China.....................Nos. 1, 2
§ Stems herbaceous, annual.—*x* Leaflets entire or cut-lobed. Ovaries 2 or 3..Nos. 3, 4
—*x* Leaflets many-cleft. Ovaries 5..............Nos. 5, 6

1 **P.** Moutan. *Tree Pæony.* Ovaries distinct, half enveloped in the disk. 3—4f, widely branching. Flowers large, double, purple varying to white. June.

2 P. PAPAVERÁCEA. Ovaries closely united into a globous capsule. 3f. Fls. white, with a purple centre, 8—10′ broad, single or double, varying to rose. May, June.

3 P. OFFICINÀLIS. *Common Red P.* Lfts. lance-ovate, incised: carpels 2, pubescent, suberect. Alps. Fls. double, red, rose, pink, flesh-colored, and white. June.

4 P. ALBIFLÒRA. *Chinese P.* Lfts. lance-elliptic, entire; carpels 2 or 3, recurved, smooth; calyx bracteate. Tartary. Fls. smaller, white, rose, carmine, &c.

5 P. ANÓMALA. Leaf-segments lance-linear; carp. depressed, smooth; cal. bracted. Siberia. Fls. concave, rose-colored, pink, &c. May, June.

6 P. TENUIFÒLIA. *Fennel P.* Segments many linear lobes, very smooth; carpels downy, spreading. Siberia. 2—3f. Fls. red, concave, open the first of May.

ORDER II. MAGNOLIACEÆ. MAGNOLIADS.

Trees or shrubs, often aromatic, with alternate, undivided leaves, and regular, polygynous, hypogynous, trimerous, imbricated flowers. *Sepals* and *petals* in several circles, often similar. *Anthers* adnate. *Ovaries* imbricated or verticillate on the enlarged torus, 1 or 2-ovuled. *Fruit* dry or baccate, distinct or coherent into a cone-like head (sorosis). *Embryo* minute, at the base of fleshy albumen. Illust. figs. 274, 278, 331.

§ WINTEREÆ. Stipules 0. Fls. ☿. Carpels arranged in a circle.................ILLICIUM. 1
§ MAGNOLIEÆ. Stipules caducous. Fls. ☿. Carpels imbricated. ∞-rowed. (*a*)
  a Anthers introrse. Leaves folded lengthwise in bud..............................MAGNOLIA. 2
  a Anthers extrorse. Leaves folded crosswise in the bud..............................LIRIODENDRON. 3
§ SCHIZANDREÆ. Stip. 0. Fls. ♂ ♀. Carpels in many rows, baccate...........SCHIZANDRA. 4

1. ILLÍCIUM, L. STAR ANISE. (Lat. *illicio*, to attract; alluding to its fragrance.) Sep. 3—6, colored. Pet. 6—30. Carpels capsular, dry, arranged circularly, each with 1 smooth, shining seed. ♄ The smooth lvs., when bruised, exhale the odor of Anise. In wet grounds. May.

1 I. Floridànum Ellis. Lvs. acuminate; petals 21—30, purple. Fla. to La. 4—8f.

2 I. parviflòrum Mx. Lvs. acute; petals 6—12, yellow. Ga. Fla. Fls. smaller.

2. MAGNÒLIA, L. (Named for *Prof. Magnol*, a French botanist of the 17th century.) Sep. 3. Pet. 6--9. Anth. longer than the filaments, introrse. Ov. imbricated, 1-celled, 2-ovuled, becoming in fruit a fleshy, cone-like *sorosis.* Seeds berry-like, suspended from the opening follicles by a slender funiculus. ♄ and ♄, with large fragrant flowers. Lvs. conduplicate in bud, with membranous deciduous stipules. Fig. 331.

* Leaves cordate or auriculate at the base. Trees.........................Nos. 5, 6, 7
* Leaves acute at the base,—rusty or glaucous beneath, coriaceous...........Nos. 1, 2
—green (not shining) both sides, thin..............Nos. 3, 4
Exotic species, cultivated....Nos. 8–10

1 M. grandiflòra L. *Big Laurel.* Trees; lvs. evergreen, rusty-downy beneath; pet. obovate, white. Swampy woods, S. States. 80f. Fls. 9′ broad, lvs. 7×4′. May.

2 M. glauca L. *White Bay.* Shrub or small tree; lvs. obtuse, glaucous-white beneath; pet. ovate-roundish, erect. Coast, Ms. to La. 5—20f. Fls. 2′, cup-shaped, strongly fragrant, with white concave petals. Lvs. nearly evergreen. South. May–July.

3 M. acuminàta L. *Cucumber Tree.* Lvs. oval, acuminate, scattered; fls. small (3—4′ broad), petals obovate. S. States, rare in N. Y. 70f. The cones of fruit bear some resemblance to a small cucumber. May.

4 **M. umbrélla** Lam. *Umbrella Tree.* Lvs. cuneate-lanceolate, whorled at the ends of the branches (like an umbrella); sep. reflexed; pet. lanceolate, acute. S. States, rare in N. Y. and O. 25f. Lvs. and fls. very large. White. May.

5 **M. cordàta** Mx. Lvs. broadly ovate, subcordate, pubescent beneath; petals 6—9, oblong, yellow, with reddish lines. Ga. Car. 40f. Lvs. downy beneath.

6 **M. Fràseri** Walt. Lvs. obovate-spatulate, auricled at the narrow base; pet. 6, pure white. Va. Ky. to Fla. 30f. Fls. 6′. Lvs. 1f. A slender tree.

7 **M. macrophýlla** Mx. Lvs. obovate-spatulate, cordate; pet. 6, rhomb-ovate, white, with a purple base inside. S. States. 20-30f. A small tree, with immense lvs. (2—3f) and fls. (petals 8′ long). June.

8 **M.** CONSPÍCUA. *Yulan.* Sep. 0 or very small; pet. 6—9, erect, of a creamy white, appearing before the leaves in early Spring. Lvs. acuminate. 15f.

9 **M.** PURPÙREA. Sep. 3; pet. 6, erect, lilac-purple outside, preceding the obovate lvs., which are pointed at both ends. China. 10—15f.

3. **LIRIODÉNDRON**, L. TULIP TREE. WHITEWOOD. (*Λειρίον*, a Lily, *δένδρον*, a tree.) Sep. 3. Pet. 6, in 2 rows, erect. Anth. opening outward. Carpels 1 or 2-seeded, imbricated into a cone, indehiscent, separating from each other at maturity. ♄ Large, with showy, bell-shaped, upright flowers. Lvs. 4-lobed, retuse-truncate at apex, induplicate in bud, with large, caducous stipules. Figs. 274, 278.

L. tulipífera L.—A noble tree, beautiful in foliage and flowers; trunk 5—8f diameter; 100f or more high; lvs. very smooth; fls. greenish-yellow, orange within, abounding in honey. May, June.

4. **SCHIZÁNDRA**, Mx. (*Σχίζω*, to cut, *ἄνδρα*, stamens.) Sep. and pet. 9—12, gradually larger inward. ♂ Stam. 5—15, monadelphous, anth. cells distinct. ♀ Carp. ∞, at first imbricated in a head, in fruit baccate, and loosely spicate on the lengthened torus. ♭ Lvs. pellucid-punctate, deciduous. Fls. solitary.

S. coccínea Mx. Lvs. ovate or oval, pointed; fls. on slender peduncles, small, red; stam. 5, in the upper fls. chiefly. Berries and torus red. Vine 12f. South.

ORDER III. CALYCANTHACEÆ. CALYCANTHS.

Shrubs with opposite, simple, exstipulate leaves, and axillary, solitary, often aromatic flowers. *Sepals* and *petals* ∞-rowed, imbricated on a tubular torus, the outer bract-like. *Filaments* ∞, inserted on the top of the torus, short. *Anthers* adnate, extrorse. *Carpels* ∞, 1-seeded, distinct, included in the green fleshy torus. *Seed* erect, without albumen.

CALYCÁNTHUS, L. SWEET-SCENTED SHRUB. (*Κάλυξ*, calyx, *ανϑος*, flower.) Sep. and pet. oblong, undistinguishable, the inner gradually shorter. Stam. apiculate, the outer longer, inner sterile. Fruit, the enlarged green torus loosely enclosing few or many achenia. ♄ Fls. lurid purple, with the fragrance of strawberries.

1 **C. flóridus** L. Lvs. oval or elliptical, acute or acuminate, scabrous, downy beneath; fls. on very short axillary branches; sep. and pet. about 20, near 1′ in length. S. States: common in gardens. Lvs. 2—5′. Shrub 4—8f. Apr. May.

2 C. lævigatus Willd. Lvs. thin, oval, obtuse or merely acute, nearly glabrous both sides; fls. smaller, sometimes inodorous. Ga. (Feay), Fla. Mar. Apr.

3 C. glaucus Willd. Lvs. ovate, acuminate, large (4—7′), glaucous beneath; sep. and pet. lance-oblong, 1′ in length. Mt. woods, Ga. to N. Car. 6—8f. May, June. †

ORDER IV. ANONACEÆ. ANONADS.

Trees or shrubs with naked buds, entire, alternate lvs. destitute of stipules. *Flowers* usually green or brown, axillary, hypogynous, valvate in æstivation. *Sepals* 3. *Petals* 6, in two circles, sometimes coherent. *Stamens* ∞, with an enlarged connectile, short filament, on a large torus. *Ovaries* several or ∞, separate or coherent, fleshy or not, in fruit. *Embryo* minute in the end of the ruminated albumen. Illust. fig. 314.

ASÍMINA, Adans. PAPAW. Sep. 3. Pet. 6, the outer row larger than the inner. Stam. densely packed in a spherical mass. Pistils several, distinct, ripening but few, which become large, oblong, pulpy fruits, with many flat seeds. Shrubs or small trees, with brownish, axillary, solitary, flowers.

* Flowers appearing before the leaves. Petals purple.......... ....Nos. 1, 2

* Flowers appearing with the leaves. Outer petals yellowish.................Nos. 3, 4

1 A. tríloba Dunal. Lvs. obovate-oblong, acuminate; pet. dark purple, the outer orbicular, 3 or 4 times as long as the sepals; fruit ovoid-oblong. N. Y., S. and W. 15—20f. Lvs. 10′, smooth. Fls. 1′, Mar. Apr. Fr. 3′, eatable in Oct.

2 A. parviflòra Dunal. Lvs. obovate-oval; pet. oval, green-purple, twice longer than sep. Woods, coastward, Car. to Fla. 2—3f. Lvs. 5′. Fls. 6″. Fr. 1′, roundish.

3 A. grandiflora Dunal. Lvs. obov.-obl. obtuse, grayish-tomentous; outer pet. very large (2′ long), yellowish white. Ga. Fla. 2—3f. Fr. small, obovate. Mar. Apr.

4 A. pygmæa Dunal. Lvs. coriaceous, evergreen, narrowly oblong or oblanceolate, smooth; pet. obov.-obl., yellowish and brownish. Ga. Fla. 6—12′. Carp. 1′. May.

ORDER V. MENISPERMACEÆ. MENISPERMADS.

Shrubs twining or climbing, with alternate, palmate-veined, exstipulate leaves. *Flowers* diœcious, rarely ☿ or ♀ ☿ ♂, hypogynous, 3–6-gynous. *Sepals* and *petals* similar, in 3 or more circles, imbricated in the bud. *Stamens* equal in number to the petals, and opposite to them, or 3 or 4 times as many. *Fruit* a 1-seeded drupe, with a large or long curved embryo in scanty albumen. Illust. 347.

♂ Stamens 12—20. Sep. 4—8, nut moon-shaped. Lvs. peltate.....................MENISPERMUM. 1

♂ Stamens 6. Sep. 6, nut moon-shaped. Lvs. sinuate, 3-lobed................COCCULUS. 2

♂ Stamens 6. Sep. 6, nut cup-shaped. Lvs. deeply 5-lobed.......................CALYCOCARPUM. 3

1. MENISPÉRMUM, L. MOON-SEED. (Μήνη, the moon, σπέρμα, seed; from the crescent form of the seed.) Fls. ♀ ♂. Sep. 4—8. Pet. 4—8, minute, retuse. ♂ Anth. 12—20, 4-celled. ♀ Ovaries and styles 2—4. ♄ Drupes 1-3-seeded. Seeds lunate and compressed. Fls. white, in axillary clusters. Fig. 347.

M. Canadénse L. St. climbing; lvs. 5-7-angled or lobed, peltate, the petiole inserted near the base; rac. compound; petals 6—7, small. ♄ Thickets: common. 8—12f. Drupes black, resembling grapes, ripe in Sept. Fls. in July.

2. CÓCCULUS, DC. (Diminutive, from Lat. *coccum*, a berry.) Fls. ♀ ♂. Sep., pet., and stam. 6. Anth. 4-celled. ♀ Ov. 3 to 6. Drupe globular-compressed, nut curved as in Menispermum. ♄ Fls. in axillary panicles, small, greenish.

C. Caroliniànus DC.—S. Ill. to Fla. 10—15f. Lvs. ovate or cordate, entire or lobed. Drupes red, 1—3 together, as large as a pea. June, July.

3. CALYCOCÁRPUM, Nutt. CUP-SEED. (*Κάλυξ*, a cup, *καρπὸς*, fruit.) Sep. 6. Pet. 0. ♂ Stam. 12. Anth. 2-celled. ♀ Stam. 6, abortive. Ov. 3. Stig. fimbriate-radiate. Drupe oval, with the putamen deeply excavated in front and cup-shaped. ♄ Fls. greenish-white, in long axillary panicles.

C. Lyòni Nutt.—Ga. to Ky. Vine 20—30f. Lvs. 6—8′ diam., lobes acuminate; drupe 1′, oval, greenish. Fls. small, 2″ diameter. June.

ORDER VI. BERBERIDACEÆ. BERBERIDS.

Herbs or shrubs with alternate leaves and with perfect, hypogynous, regular flowers. *Sepals* and *petals* imbricated in bud, each in one or several rows. *Stamens* as many as the petals, and opposite to them, rarely more. *Anthers* opening mostly by valves, hinged at top. *Pistil* 1. *Style* short or none. *Fruit* a berry or capsule. *Seeds* several, albuminous. Illust. 49, 91, 92, 189, 364, 403, 426.

§ Shrubs, with bristly-serrate leaves, yellow flowers and acid berries................BERBERIS. 1
§ Herbs.—* Anthers opening by 2 valves hinged at the top...(*a*)
  a Stamens 6. Fruit 2, drupe-like, soon-naked seeds..................CAULOPHYLLUM. 2
  a Stamens 6. Berry 1-4-seeded. Petals white, larger than sep.....DIPHYLLEIA. 3
  a Stamens 8. Pod opening by a lid. Petals 8............................JEFFERSONIA. 4
 —* Anthers opening by slits. Stamens 9—18.....................................PODOPHYLLUM. 5

1. BÉRBERIS, L. BERBERRY. (Name from the Arabic.) Calyx of 6 obovate, spreading, colored sepals, with the 3 outer ones smaller. Corolla of 6 suborbicular petals, with 2 glands at the base of each. Fil. 6, flattened. Anth. opening by uplifted valves. Style 0. Berry oblong, 1-celled. Seeds 2 or 3. ♄ with yellow wood and yellow fls. Figs. 91, 92, 403.

1 **B. vulgàris** L. Spines (reduced lvs.) 3-forked; lvs. simple, serratures terminated by soft bristles; raceme pendulous, many-flowered; pet. entire; berries oblong. N. States. 6—9f. Rac. 12-flowered. Berries red, very tart. May, June.

2 **B. Canadénsis** Ph. Lvs. repandly-toothed, teeth with short, soft bristles; rac. few (6-8)-flowered; pet. notched; berries oval. Mts. Va. to Ga. 2—3f. May, June.

3 **B.** AQUIFÒLIUM Ph. Lvs. pinnate; lfts. 7—11, coriaceous, polished, evergreen, spinulous-toothed; clusters erect, crowded. Oregon. 3—5f. Berries globular. April.

2. CAULOPHÝLLUM, Mx. COHOSH. (*Καυλὸς*, stem, *φύλλον*, leaf; the stem appearing as the stalk of the compound leaf.) Cal. of 6 green sepals, 3-bracted at base. Cor. of 6 short, gland-like thickened petals, opposite the sepals. Stam. 6. Ov. 2-ovuled, becoming a thin pericarp, which soon breaks away after flowering, and the 2 round drupe-like seeds ripen naked. ♃ Glabrous and glaucous, arising from a knotted rhizome. Lvs. 2 only, 2 and 3-ternate.

C. thalictroìdes Mx. *Pappoose Root.*—Can. to Car. and Ky. 1—2¼f. Lfts. lobed. 2—3′. Fls. greenish, in a simple terminal panicle. Seeds on thick stipes, blue, as large as peas. May.

3. **DIPHYLLÈIA**, Mx. Umbrella-leaf. (δὶς, twice, φύλλον, leaf.) Calyx of 5 sepals, caducous. Cor. of 6 oval petals larger than the sepals. Stam. 6. Ov. eccentric. Stigma subsessile. Berry few-seeded, seeds attached laterally below the middle. ♃ Glabrous, arising from a thick, horizontal root-stock. Lvs. simple, peltate, 1 or 2 only.

D. cymòsa Mx.—Mts. Va. to Ga. and Tenn. 1—2f. Leaf centrally peltate, or if 2, alternately reniform-peltate, ample, lobed. Fls. white. June. Berries blue.

4. **JEFFERSÒNIA**, Bart. Twin-leaf. (In honor of *President Jefferson*, a patron of science.) Sep. 4. Pet. 8, spreading. Anth. 8, linear. Stig. peltate. Caps. obliquely obovate, stiped, circumscissile, opening by a lid. ♃ Rhizome and matted fibres blackish. Scape bearing a single flower, as tall as the 2-parted or binate leaves. Figs. 49, 189, 364, 426.

J. diphýlla Bart.—N. Y., W. and S. 1f. Fl. handsome, white. April. A singular plant, called *Rheumatism Root.* The pod has a persistent lid.

5. **PODOPHÝLLUM**, L. May Apple. (Ποὺς, ποδὸς, foot, φύλλον, leaf.) Sep. 3, concave, caducous. Pet. 6—9, obovate, concave. Anth. 9—18, linear. Berry large, ovoid, 1-celled, crowned with the solitary stigma. ♃ Barren stems with 1 centrally peltate leaf, flowering stems with 2 equal, opposite broad cordate-peltate leaves, and a large white flower between.

P. peltàtum L.—In rich shady soils. 1f. Fl. nodding, 2′. May. Fruit the size of a plum, with flavor of strawberry. July. Lvs. and roots poisonous.

Order VII. NYMPHÆACEÆ. Nymphiads.

Herbs perennial, aquatic (in deep water), with rhizomes submersed, scapes one-flowered (rarely a leafy stem), and leaves peltate or deep-cordate. *Flowers* regular, showy, hypogynous (rarely epigynous), with imbricated petals and sepals. *Carpels* 3—∞, distinct or united. *Ovules* parietal, never on the ventral suture. *Seeds* with the embryo enclosed in a sac at the end of copious albumen, or (in Nelumbium) exalbuminous. Illust. 202, 407–414, 505, &c.

§ CABOMBEÆ. Sepals 3. Petals 3. Carpels distinct, few-ovuled. Flowers small. (*a*)
  a Stam. 6. Carpels 3. Submersed leaves dissected..........Cabomba. 1
  a Stam. 6—18. Carpels 6—∞. Leaves all peltate..........Brasenia. 2
§ NELUMBONEÆ. Sep. 4 or 5. Pet. and stam. ∞. Carp. immersed in the torus, distinct, exalbuminous. Fls. very large..........Nelumbium. 3

§ NYMPHEÆ. Sep. 4—6. Pet. and stam. ∞. Carp. united. Fls. large, showy. (*b*)
b Pet. (stamen-like) and stam. hypogynous. Fls. yellow..............................NUPHAR. 4
b Pet. petaloid. Stamens epigynous (on the torus raised into a disk). ....NYMPHEA. 5
b Pet. (petaloid), sep. and stamons epigynous. Lvs. peltate........................VICTORIA. 6

1. BRASÈNIA, Schreb. WATER TARGET. Sep. 3 or 4, colored within, persistent. Stam. 12—24. Pet. 3 or 4. Carp. 6—18, oblong, 2 (or by abortion 1)-seeded. ♃ The stems and under surface of the leaves are covered with a viscid jelly. Lvs. all floating, entire, elliptical.

B. peltàta Ph. Pools and muddy shores. The slender ped. and petioles long as the depth of the water. Lvs. 2¼ × 1′. Fls. purple, 6″ broad. July.

2. CABÓMBA, Aublet. Sep. 3, petaloid. Pet. 3. Stam. 6. Pistils 3 (rarely 2 or 4), nearly the length of stamens, and half as long as the petals and sepals. Carp. few-seeded. ♃ Lvs. opposite, mostly submersed and filiformly dissected. Fls. in the axils of the floating lvs.

C. Caroliniàna Gray. Floating lvs. few and small (6″ × 1″), immersed lvs. many. Stems branched. Fls. white, 6″, strictly trimerous. July, Aug.

3. NELÚMBIUM, Juss. (*Nelumbo* is the name of the species in Ceylon.) Pet. and stam. ∞, hypogynous, in many rows. Carp. ∞, separate, becoming 1-seeded nuts, imbedded in as many cavities on the large, obconic, fleshy torus. Seed with large cotyledons, very short radicle and no albumen. Rhizome horizontal. Lvs. peltate, emersed. Scape 1-flowered. There are only 2 species, N. speciosum of E. India, and

N. lùteum L. Petals yellowish; anth. lengthened beyond the cells to a clavate appendage. A magnificent aquatic, frequent S. and W. In Sodus Bay, N. Y. (Hankenson), Lyme, Ct., near Philadelphia (Parish). Lvs. erect, round, centrally peltate, 10—18′. Fls. several times larger than those of Nymphæa odorata, fragrant. Nuts as large as acorns. June—Aug.

4. NUPHAR, Smith. YELLOW POND-LILY. (*Neufar* is the Arabic name.) Sep. 5 or 6, concave. Pet. ∞, small, linear, inserted with the ∞ stamens on the torus. Stig. discoid, with prominent rays. Caps. ∞-celled, ∞-seeded. ♃ Lvs. sagittate-cordate at the base, entire at the margin, on stout stalks.

1 **N. ádvena** Ait. Lvs. floating or erect, oval; lobes rounded, petioles half terete; stig. 12-24-rayed; sep. 6, unequal. Slow streams and muddy pools. Lvs. thick and large. Fls. deep yellow (save the 3 outer sep.), 2′ diam., globular. June, July.

2 **N. Kalmiàna** Ait. Lvs. floating and submersed, the latter membranous, reniform-cordate; stig. 8-14-rayed, crenate; sepals 5, equal. Plant small and delicate. Floating leaves oval, 1—3′ long, the lobes nearly meeting. Flowers about 1′ diam. Sum.

3 **N. sagittifòlia** Ph. Leaves oblong, sagittate-cordate, obtuse; sep. 6; pet. 0; anth. subsessile. Slow waters, N. Car. to Ga. Lvs. 10—15′. Fls. 2′, globular. June, July.

5. NYMPHÆ̀A, L. WATER-LILY. Sepals 4 or 5. Pet. ∞, gradually passing into stamens, adherent to the ovary. Stamens ∞, the outer with broad filaments. Stigma surrounded with rays. Seeds ∞, arillate. ♃ ≈ Flowers white, roseate, or blue, very lovely. Figs. 202, 407–414.

1 **N.** CŒRÙLEA. Lvs. crenate, lobes partly united, becoming peltate; pet. sky-blue. Egypt.

2 N. odoràta L. Lvs. orbicular, entire, cleft at base to the insertion of the petiole; fls. very fragrant, open from 6 A. M. to 3 P. M. upon the water's surface, white, varying to rose-color; seeds oblong. June—Aug.

3 N. tuberòsa Paine. Lvs. reniform-orbicular, cordate-cleft, 1f wide; rhizome bearing tubers, which separate spontaneously; fls. nearly scentless; seeds globular. N. Y. (Oneida Lake; Sodus Bay (Hankenson), and westward. Aug.

6. VICTŎRIA, Lindl. (Name in honor of *Queen Victoria.*) Carp. immersed in the cup-form torus, united. Sep. 4. Pet. ∞, graduated into stamens, as in Nymphæa. Lvs. spiny, floating, strongly veined.

V. RÈGIA is the only species, native of the rivers of Trop. Am.; rarely cultivated. The lvs. are several feet in diam. Fls. like immense Water Lilies.

ORDER VIII. SARRACENIACEÆ. WATER PITCHERS.

Herbs, aquatic, in bogs, with fibrous roots, perennial, and with the *leaves* all radical, urn-shaped, or trumpet-shaped, and large flowers on scapes. *Floral envelopes* 4—10, imbricated, the outer greenish, sepaloid. *Stamens* ∞, hypogynous. *Carpels* united into a several-celled capsule. A curious family, remarkable for its leaves, which are of that class called *ascidia* (§ 322), holding water. Figs. 392, 393, 394.

1. SARRACÈNIA, Tourn. PITCHER PLANT. (In honor of *Dr. Sarrazen*, of Quebec.) Sep. 5, colored, persistent, subtended by 3 bractlets. Pet. 5, incurved, deciduous. Stig. 5, united into a large peltate, persistent membrane, covering the ovary and stamens. Caps. 5-celled, 5-valved. Seeds very numerous. ♃ Lvs. all radical, urn-shaped or trumpet-shaped, with a wing on the front side and a hood (the lamina) at top. Fl. large, nodding.

§ Lamina inflected over the throat of the tube........................Nos. 1, 2
§ Lamina erect or nearly so, the throat open. (*)
  * Leaf-tube pitcher-shaped, with a broad wing............................No. 3
  * Leaf-tube trumpet-shaped, with a narrow wing...........................No. 4

1 S. psittacìna Mx. Lvs. short, reclined, with a broad semi-ovate wing; fls. deep purple. Bogs, Fla. Ga. La. 1f. Tube nearly closed. The leaf resembles a *parrot* in form, hence the specific name. March.

2 S. variolàris Mx. Lvs. elongated, suberect, mottled with white on the back; fls. yellow. Bogs, S. Car. to Fla. Lvs. 12—18′, scape shorter.

3 S. purpùrea L. *Side-saddle Flower.* Lvs. short, recumbent, inflated most near the middle; lamina broad-cordate. Bogs: common. Scapes 14—20′, each bearing a large handsome deep-purple flower, in June.

β. ***heterophýlla*** Torr. Fls. greenish yellow. No purple veins in the lvs. Ms.
γ. ***alata.*** Fls. large, yellow. Lvs. slender, erect, wing but 6″ broad. La. 1—2f.

4 S. Gronòvii Wood. *Trumpet-leaf.* Lvs. tall, erect, tube gradually enlarged to the open throat, wing narrowly linear, lamina roundish, contracted at base. Swampy pine-woods, S. States. 2—3f. Fls. very large, 4—5′ broad.

α. ***flava.*** Foliage yellowish green, fls. yellow. Plant large.
β. ***rubra.*** Foliage with purple veins, fls. red-purple. Plant smaller.
δ. ***Drummóndii.*** Lvs. mottled above, with purple veins and white diaphanous interstices. Plant very large. Fla.

ORDER IX. PAPAVERACEÆ. POPPY-WORTS.

Herbs with alternate, exstipulate leaves, and generally a milky or colored juice. *Flowers* solitary, on long peduncles, never blue, hypogynous, regular, $\sqrt[2]{}$ or $\sqrt[4]{}$. *Sepals* 2, rarely 3, caducous, and *petals* 4, rarely 6, all imbricated. *Stamens* indefinite, but some multiple of 4. *Anthers* 2-celled, innate. *Ovaries* compound. *Style* short or 0. *Stigmas* 2, or if more, stellate upon the flat apex of ovary. *Fruit* either pod-shaped, with 2 parietal placentæ, or capsular, with several. *Seeds* ∞, minute. *Embryo* minute, at the base of oily albumen. Illust. 148, 344, 404, 405, 406, 463, 493.

¶ Plants with a white juice. Petals 4, crumpled in bud..........................PAPAVER. 6
¶ Plants with a watery juice. Calyx a mitre, falling off whole....................ESCHSCHOLTZIA. 7
¶ Plants with a red juice. Petals 8, plane in the bud..........................SANGUINARIA. 1
¶ Plants with a yellow juice. Petals crumpled in the bud. (*)
  * Stigmas and placentæ 2 only. Capsule long, pod-shaped. (*a*)
  * Stigmas and placentæ 3, 4, or 6. Capsule ovoid. (*b*)
    a Pod 1-celled, smooth. Lvs. pinnate..........................CHELIDONIUM. 2
    a Pod 2-celled, rough. Lvs. palmate..........................GLAUCIUM. 3
      b Style distinct, but short..........................MECONOPSIS. 4
      b Style none, stigma sessile..........................ARGEMONE. 5
        † No petals. Juice reddish..........................BOCCONIA. 8

1. SANGUINÀRIA, L. BLOOD-ROOT. (Latin *sanguis*, blood; all its parts abound in a red juice.) Sep. 2, caducous. Pet. 8—12, in 2 or 3 rows, the outer longer. Stam. about 24. Stig. sessile, 1 or 2-lobed. Capsule silique-form, oblong, 1-celled, 2-valved, acute at each end, many-seeded. ♃ A low, acaulescent plant, with a white flower, and a glaucous, palmate-veined leaf. Fig. 463.

S. Canadénsis L. An interesting flower, appearing in early Spring: common in the woods. 6′. From each bud of the root-stalk there springs a single large, glaucous leaf, and a scape with a single flower. Leaf kidney-shaped, with roundish lobes separated by rounded sinuses. Fl. of a quadrangular outline, white, scentless, and of short duration. The juice is emetic and purgative.

β, Leaf not lobed, margin undulate. Bainbridge, Ga., and elsewhere.

2. CHELIDÒNIUM, L. CELANDINE. (*Χελιδὼν*, the swallow, being supposed to flower with the arrival of that bird, and to perish with its departure.) Sep. 2. Pet. 4, roundish, contracted at base. Stam. 24—32, shorter than the petals. Stig. small, sessile, bifid. Capsule silique-form, linear, 2-valved, 1-celled. Seeds crested. ♃ Fragile, pale green, with saffron-yellow juice. Figs. 344, 493.

C. màjus L. Lvs. pinnate; lfts. lobed, segments rounded; fls. in umbels. By fences, roadsides, &c. 1—2f. Fls. in loose umbels, yellow, very fugacious. May—Oct.

3. GLAÙCIUM, Tourn. HORN POPPY. (*Γλαυκὸν*, glaucous, the hue of the foliage.) Sep. 2. Pet. 4. Style none. Stig. 2-lobed. Pod 2-celled, linear, very long, rough. ① or ② sea-green herbs, with clasping leaves, yellow juice, and solitary, yellow flowers.

G. lùteum Scop. Sparingly naturalized near the coast, from the Potomac southward. ♃ Lvs. 5-7-lobed. Fls. 2′, of short duration. Pods 6—9′. June—Aug.

4. **MECONÓPSIS**, Viguier. YELLOW POPPY. (*Μήκων*, a poppy, *ὄψις*, resemblance.) Sep. 2, hirsute. Pet. 4. Style conspicuous. Stig. 4—6, radiating, convex, free. Capsule ovoid, 1-celled, opening by 4 valves. ♃ Herbs with a yellow juice, pinnately-divided leaves, and stems 2-leaved, bearing an umbel.

M. diphýlla DC. Lvs. sinuately 5-7-lobed, the cauline but 2, opposite; fls. few, large (2′), yellow; pod bristly, oval. Woods, W. States. 12—18′. Pet. orbicular; style surpassing the stamens; pod 3′. May.

5. **ARGEMÒNE**, L. PRICKLY POPPY. (*Ἄργεμος*, a disease of the eye, which this plant was supposed to cure.) Sep. 2 or 3, caducous, smaller than the 4 or 6 roundish petals. Stig. sessile, capitate, 4 or 6-rayed. Capsule ovoid, prickly, opening at the top by valves. ① Herbs with yellow juice, spinous-pinnatifid leaves, and showy flowers.

A. Mexicàna L. Calyx prickly; caps. prickly, 6-valved; fls. axillary and terminal, 2—3′ diam., yellow, varying to white. Waste grounds, South.

6. **PAPÀVER**, L. POPPY. (Celtic, *papa*, pap, a soporific food for children, composed of poppy seeds, &c.) Sep. 2, caducous. Pet. 4. Caps. 1-celled, opening by pores under the broad, persistent 4–20-rayed stigma. Exotic herbs, with white juice, abounding in opium. Fl. buds nodding, erect in flower and fruit. Figs. 148, 404–6.

1 **P. somníferum** L. *Opium Poppy.* Glabrous and glaucous; lvs. clasping, cut-dentate; caps. globous. ① with large white or purplish flowers, often double. 1½—3f. Extensively cultivated for opium. June, July. §.

2 **P.** DÙBIUM L. St. hispid with spreading hairs; lvs. pinnately-parted; segm. incised; sep. hairy; caps. club-shaped. ① Fields. 2f. Slender. Fls. light red or scarlet. June, July. §.

3 **P.** RHÆAS L. St. many-flowered, hairy; lvs. incisely pinnatifid; caps. globous. ① Fls. very large, deep scarlet, more or less double. June, July.

4 **P.** ORIENTÀLE L. St. 1-flowered, rough; lvs. scabrous, pinnate, serrate; caps. smooth. ♃ Levant. 3f. Fls. very large, scarlet, too brilliant to be looked upon in the sun. June.

7. **ESCHSCHÓLTZIA**, Cham. (Named for *Eschscholtz*, a German botanist well known for his researches in California.) Sep. 2, cohering, caducous. Pet. 4. Stam. ∞, adhering to the claws of the petals. Stig. sessile. Caps. pod-shaped, cylindric, 10-striate, many-seeded. ① Lvs. finely pinnatifid, glaucous. The juice, which is colorless, exhales the odor of hydrochloric acid.

1 **E.** DOUGLÁSII Hook. St. branching, leafy; torus obconic; cal. ovoid, with a very short, abrupt acumination; pet. bright yellow, with an orange spot at base. Cal. Oreg. Foliage smooth, abundant, and rich. Fls. 2′—3′ broad.

2 **E.** CALIFÓRNICA Hook. St. branching, leafy; torus funnel-form, with a much-dilated limb; cal. conic, with a long acumination; flowers orange-yellow. Cal.

8. **BOCCÒNIA**, Plum. Sep. 2, colored. Pet. 0. Sty. bifid. Caps. 2-valved, 1–3-seeded. ♃ Cult. for the handsome glaucous lvs. Fls. in panicles.

1 **B.** CORDÀTA. Lvs. roundish, cordate, many-lobed, veiny; flowers white or yellowish, numerous in the ample pyramidal panicle, in Summer. From China. Hardy.

2 **B.** FRUTÉSCENS. Lvs. oblong, large, sinuate-lobed, splendid; fls. in Spr. Wh. W. Ind.

ORDER X. FUMARIACEÆ. FUMEWORTS.

Herbs smooth and delicate, with a watery juice. *Leaves* exstipulate, alternate, many-cleft. *Flowers* irregular. *Sepals* 2, very small. *Petals* 4, parallel, one or both of the outer saccate, 2 inner cohering at apex. *Stamens* 6, diadelphous. *Anthers,* 2 outer 1-celled, middle 2-celled. *Ovaries* superior, 1-celled. *Fruit* a nut 1–2-seeded, or a capsule ∞-seeded. *Seeds* shining, arilled. *Albumen* fleshy. Illust. 61, 252–4.

* Corolla equally 2 spurred or 2-saccate at base. (*a*)
* Corolla unequal, only 1 of the petals spurred. (*b*)
a Petals slightly united or distinct, mostly deciduous. Not climbing............DICENTRA. 1
a Petals firmly united, persistent. Plants climbing..............................ADLUMIA. 2
b Ovary with several seeds, forming a slender pod..............................CORYDALIS. 3
b Ovary with 1 seed, forming a globular nut.....................................FUMARIA. 4

1. DICÉNTRA, Borkh. EAR-DROP. Sep. 2, very small, sometimes disappearing. The 2 outer petals alike, saccate at base, with spreading tips; the 2 inner alike, spoon-shaped, crested, meeting face to face over the stam. and pistil. Fil. flat, in 2 sets, united at top. Stig. 2-crested. Pod many-seeded. ♃ Lvs. ternately divided or cleft. Fls. racemed, nodding. Delicate and beautiful plants. Figs. 61, 252–4.

* Herbs native, acaulescent, the sepals small but manifest......................Nos. 1, 2, 3
* Herbs exotic, caulescent, the sepals obsolete or wanting........................No. 4

1 **D. cucullària** DC. *White Ear-drop.* Root bulb-like; spurs of the fls. divergent, acute, straight; flower nearly as broad as long. Woods, Can. to Ky. 6—10′. Lvs. all radical of numerous oblong linear segm. The bulb consists of reddish, scale-like tubers. Apr. May.

2 **D. Canadénsis** DC. *Squirrel-corn.* Root bearing yellow tubers as large as peas; rac. simple; fls. white, cordate-ovate; spurs rounded, incurved. Rocky woods, Can. to Ky. 6—8′. Lvs. as in No. 1. Fls. fragrant. May, June.

3 **D. exímia** DC. *Purple E.* Rhizome scaly; rac. paniculate; fls. cordate-oblong, rose-purple, spurs blunt, incurved; sep. ovate, acute; lvs. triternate, segm. cut into oblong, acute lobes. N. Y. to Oreg.! 10—15′. Fls. all summer. †

4 **D.** SPECTÁBILIS. *Bleeding Heart.* Stems recurved, branched; lvs. biternate, segm. 2 or 3-lobed; fls. in spreading racemes, bright purple; cor. broad, heart-shaped; sep. obsolete. China. Very fine and showy.

2. ADLÙMIA, Raf. MOUNTAIN FRINGE. Sepals 2, minute. Petals 4, united into a cellular, monopetalous corolla, persistent, bi-gibbous at base, 4-lobed at apex. Stam. united in 2 equal sets. Pod 2-valved, many-seeded. ② ♄ Delicate, with tripinnate leaves, and ample pendulous cymes.

A. cirrhòsa Raf.—Rocky hills, Can. to N. Car. 20f. The leaf-stalks serve for tendrils. Leaflets 3-lobed. Flowers pinkish white. June—Aug.

3. CORÝDALIS, DC. Sepals 2, small. Petals 4. Corolla with a single spur at base on the upper side. Capsule silique-form, many-seeded. Seeds crested or arilled. Herbs caulescent, with multifid leaves. Racemes bracted, with ebracteolate pedicels.

1 **C. glaùca** Ph. Glaucous, erect; fls. red, yellow at the tip; pods erect; lobes of the leaflets obtuse, bracts minute. ② Rocky woods, Can. to N. Car. 1—4f. Raceme terminal. Flowers horizontal, spur short, blunt. May, June.

2 **C. aùrea** Willd. Low, diffuse, finally ascending; leaf-lobes acute; rac. opposite the lvs. and terminal; fls. secund, bright yellow, spur deflected; pods pendulous, torulous; seeds turgid, polished. ① Rocky shades. 8—12′. Cor. 6″. Bracts lance-ovate. Apr.—July.

β. ***macrántha.*** Fls. 10″, spur nearly as long as limb; bracts and leaf-lobes linear. Dakota; sent by Dr. W. Matthews.

γ. ***flávula.*** Fls. 3—4″, pale yellow, spur very short, petals pointed. Common.

3 **C. montàna** Engelm.? Ascending; rac. terminal; leaf-lobes obtuse, bracts lanceolate; cor. yellow, spur ascending, nearly as long as limb, lower petal at length pendent; pods erect; seeds lenticular. La. Tex.!

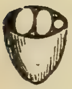
4. **FUMÀRIA**, L. FUMITORY. (Lat. *fumus*, smoke; from its disagreeable odor.) Sep. 2, caducous. Pet. 4, unequal, 1 of them spurred at the base. Nut ovoid or globous, 1-seeded, and indehiscent. Lvs. cauline, finely dissected.

F. officinàlis L. Diffusely branched, erect; lvs. bipinnate; rac. loose; fls. minute, purple at the tip; calyx serrated; ped. erect, twice longer than bract; nut round-retuse. ② Waste grounds, §. 1f. July, Aug.

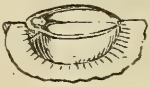
ORDER XI. CRUCIFERÆ. CRUCIFERS.

Herbs with a pungent, watery juice, and alternate, exstipulate leaves, with *flowers* cruciform, tetradynamous, generally in racemes, and bractless. *Sepals* 4, deciduous. *Petals* 4, hypogynous, with long claws and spreading limbs. *Stamens* 6, the 2 outer opposite ones shorter than the 4 interior. *Ovary* 2-carpelled, 2-celled by a false partition, with parietal placentæ. *Fruit* a silique, or silicle, usually 2-celled. *Stigmas* 2, sessile. *Seeds* 2-rowed in each cell, but often so intercalated as to form but 1 row. *Embryo* with the 2 cotyledons variously folded on the radicle. *Albumen* 0. Illust. 55, 104, 192, 193, 239, 336, 429, 506.

1



2



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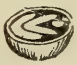


A large and important Order, difficult of analysis. The Genera cannot be well distinguished by their flowers, so nearly alike are they in all. Their characters are taken from the fruit and seeds. Hence it is indispensable that specimens for analysis should be *in fruit* as well as in flower. DeCandolle arranged the Genera into Tribes according to the folding of the cotyledons upon the radicle. This occurs in three different modes, as follows:

Cotyledons incumbent, when they are so bent or folded as to apply the back of one of them to the radicle, as in the seed of Capsella, fig. 1.

Cotyledons accumbent, when they are so turned as to apply their edges to the radicle, as seen in the seed of Arabis Canadensis, fig. 2.

Cotyledons conduplicate, when they are not only *incumbent*, as in the first case, but also folded on and partly embracing the radicle, as in Mustard, fig. 3.

In the following table we endeavor to combine with the systematic arrangement of DeCandolle a more practical artificial method:

* Crucifers native, or cultivated for food. (§)
* Crucifers exotic, cultivated for ornament or art. (§ §)
§ Fruit a long pod, silique (§ 166), opening by 2 valves. (*a*)
§ Fruit a short pod, silicle (§ 166), opening by 2 valves. (*e*)
§ Fruit a jointed pod, loment, partitioned across........Nos. 28, 29
a Flowers cyanic.—*b* Seeds arranged in a double row in each cell........Nos. 1, 2
—*b* Seeds in 1 row.—*c* Pods sessile on the torus........Nos. 3, 4, 5
—*c* Pods on a slender stipe........No. 12
a Flowers yellow.—*d* Seeds flat, wing-margined........No. 6
—*d* Seeds ovate or oblong........Nos. 9, 10, 11
—*d* Seeds globular........No. 15
e Flowers bright yellow. Silicle turgid, or slightly flattened........Nos. 1, 20, 21
e Flowers cyanic.—*f* Silicle turgid, with a broad partition........Nos. 19, 22
—*f* Silicle flattened parallel with a broad partition........Nos. 16, 18
—*f* Silicle flattened contrary to the narrow partition........Nos. 24, 26
§ § Fruit a silique or long pod, opening by 2 valves........Nos. 7, 8, 13, 14
§ § Fruit a silicle—*g* with 1 seed only, and indehiscent........No. 27
—*g* with 2 or more seeds.—*h* Petals all equal........Nos. 16, 17
—*h* Petals unequal........No. 23

TRIBE I. ARABIDEÆ.—Pods mostly elongated. Seed oval or orbicular, more ar less flattened. Cotyledons accumbent (=○).
1 Seeds small, turgid, in a turgid, oblong or oval pod........Nasturtium.
2 Seeds flattened, in a long, linear pod. Plants very erect........Turritis.
3 Silique linear, seeds in 1 row, not bordered. Purple........Iodanthus.
4 Silique linear, each valve with 1 central vein, not opening elastically........Arabis.
5 Silique linear or lanceolate, valves veinless, opening elastically........Cardamine.
6 Silique oblong, flattened, seeds wing-margined. Leaves radical........Leavenworthia
7 Silique long, ∞-seeded. Stigmas distinct, 2-horned........Matthiola.
8 Silique long, ∞-seeded. Stigmas capitate. Leaves entire. Flowers yellow..Cheiranthus.
9 Silique 4-angled, 2-edged, rigid. Leaves lyrate-pinnatifid........Barbarea.

TRIBE II. SISYMBRIEÆ.—Pod elongated. Seeds oblong. Cotyledons incumbent (‖○), oblong.
10 Calyx erect. Pods 4-sided, valves strongly 1-veined. Leaves lanceolate........Erysimum.
11 Calyx half spreading. Pods subterete. Leaves dissected or incised........Sisymbrium.
12 Very smooth herbs, with the white flowers in corymbs. South........Warea.
13 Stigma of 2 converging lobes. Petals entire, oblique. Leaves lanceolate.....Hesperis.
14 Stigma lobes connate. Petals pinnatifid, involute in æstivation........Schizopetalon.

TRIBE III. BRASSICEÆ.—Pods elongated. Seeds globular, ((○.
15 Pod terete or 4-sided........Brassica.

TRIBE IV. ALYSSINEÆ.—Fruit short, septum broad. Seeds in 2 rows. Cotyledons =○.
16 Silicle mostly orbicular, flattened. Cells 1–4-seeded........Alyssum.
17 Silicle very large, orbicular-oval, very flat, stipitate. Cultivated........Lunaria.
18 Silicle oblong or elliptical. Seeds ∞, not margined. Pet. entire or 2-cleft....Draba.
19 Silicle globular or ellipsoid. Seeds few. Flowers white........Armoracia.
20 Silicle globular, inflated, thin, veinless. Flowers yellow........Vesicaria.

TRIBE V. CAMELINEÆ.—Pods mostly short. Septum broad. Cotyledons ‖○.
21 Silicle obovoid, with ventricous valves, many seeds. Flowers yellow........Camelina.
22 Silicle oval, turgid, few-seeded. Leaves linear, radical. Flowers white........Subularia.

TRIBE VI. THLASPIDEÆ.—Pods short, septum narrow. Cotyledons accumbent. (23)..Iberis.

TRIBE VII. LEPIDINEÆ.—Pods short, septum narrow. Cotyledons incumbent.
24 Silicle triangular, many-seeded. Flowers white........Capsella.
25 Silicle oval-orbicular, 2-seeded. Flowers white, often incomplete........Lepidium.
26 Silicle didymous, each half 1-seeded. Flowers minute........Senebiera.

TRIBE VIII. ISATIDEÆ.—Silicle short, 1-celled, 1-seeded, indehiscent. (27) Cult....Isatis.

TRIBE IX. CAKALINEÆ.—Pod 2-jointed. Cotyls. =○. (28) Fleshy sea-side herbs...Cakile.

TRIBE X. RAPHANEÆ.—Pod moniliform. Cotyledons ((○. (29) Leaves lyrate....Raphanus.

1. NASTÚRTIUM, R. Br. WATER-CRESS. (Lat. *nasus tortus*, nose tortured; alluding to the pungent qualities.) Sep. spreading. Siliques subterete, turgid, generally curved upward, often shortened to a silicle, valves veinless. Seeds small, ∞, turgid, generally arranged in a double row in each cell (=○). ≈ with pinnate or pinnatifid leaves.

* Petals white. Siliques rather long (10—12″)..............................No. 1
* Petals yellow, minute. Siliques shortened (4—8″), but longer than the pedicels. (*a*)
* Petals yellow. Siliques or silicles (1—6″), shorter than the pedicels. (*b*)
  a Leaves pinnate or pinnatifid. Diffusely branched......................Nos. 2, 3
  a Leaves lyrate, or merely toothed. Stems erect..........................Nos. 4, 5
    b Petals not longer than the calyx, obscure............................Nos. 6, 7
    b Petals longer than the calyx, bright yellow, the flowers showy.....Nos. 8, 9

1 **N. officinàle** R. Br. *English W.* Lvs. pinnate, lfts. ovate, subcordate, repand; petals white, longer than the calyx. ♃ Springs, &c. May, June. § ‡

2 **N. tanacetifòlium** Hook. Upper leaf-segm. confluent, lower distinct, oblong, or roundish, sinuate-toothed, teeth obtuse; pods 4—8″, ped. ¼ as long. ② South.
  *β. **obtúsum.*** Lfts. mostly distinct, obtuse, oval. Pods shorter (3—5″). Miss. R.

3 **N. Wálteri** Wood. Segments of the leaves all distinct, narrow, with a few linear, acute lobes or teeth; pods linear (5″), ped. 2—3″. ♃ South. 3—5′. March, April.

4 **N. limòsum** N. Lvs. lanceolate, toothed, the lower lyrate; pods elliptic-oblong, 3—4″, ped. much shorter. ② Rivers, La. 10—15′. Fls. minute. Too near the next.

5 **N. sessiliflòrum** N. Lvs. wedge-obovate, repandly-toothed or subentire; pods linear-oblong, 5—6″, subsessile. ② Miss. Riv. Stem erect. Fls. minute. Apr.—June.

6 **N. palústre** DC. *Marsh Cress.* Glabrous; lvs. pinnately lobed, amplexicaul, lobes confluent, dentate; rt. fusiform; pet. as long as the sepals; silicle spreading, turgid, twice longer than wide. ♃ Wet places. 1—2f. Pod 3″. June—Aug.

7 **N. híspidum** DC. Villous; lvs. runcinate-pinnatifid, lobes obtusely dentate; silicles tumid, ovoid, or globular, the pedicels longer, ascending; pet. scarcely as long as the calyx. ② Streams, 1—3f. Pod 1″. Ped. 2—3″. June—Aug.

8 **N. sylvéstre** R. Br. *Wood Cress.* Lvs. pinnately divided, segm. serrate or incised; pods linear, style very short. ♃ Meadows, Ms. to Pa. Rare. June, July. §

9 **N. sinuàtum** Nutt. Lvs. pinnatifid, segm. lance-oblong, nearly entire; pods oblong, acute, with a slender style. ♃ Rivers, St. Louis to Oreg. June.

2. TÚRRITIS, Dill. TOWER MUSTARD. (Lat. *turris*, a tower; from the strict form of the plants.) Sep. erect, converging. Seeds flattened, minute, in 2 rows in each cell of the long, narrowly-linear 2-edged silique; valves plane, 1-veined. Embryo =○. Glabrous and strictly erect, stem-leaves sagittate-clasping. (Runs into Arabis.)

1 **T. glàbra** L. Fls. cream-white, erect; silique long (3′), strictly erect; stem lvs. ovate-lanceolate. ① Can., rare in N. Eng. 2—3f. Glaucous. Lvs. entire. July.

2 **T. strícta** Graham. Fls. rose-white, erect; silique long (3′), erect, finally ascending or spreading; stem lvs. linear-lanceolate. ② Rocks, N. Y. (rare) to Oreg. 1—2f. May.
  *β. **brachycárpa.*** Fls. and siliques spreading, the latter shorter (1′). Westward.

3. IODÁNTHUS, T. & G. FALSE ROCKET. (*Ιώδης*, violet-colored, *ἄνθος*, flower.) Calyx closed, shorter than the claws of the petals. Silique linear, terete, veinless. Seeds arranged in a single row in each cell (=○). ♃ Glabrous, with violet-purple flowers in panicled racemes. Leaves lanceolate.

I. hesperioìdes Torr & Gr. Penn. to Ill. and Ark. 2—3f. Lvs. serrate or the lower pinnatifid-lyrate. Pods 15—20″, spreading. May, June. (Arabis, Gr.)

4. **ÁRABIS**, L. ROCK-CRESS. Sepals mostly erect; silique linear, compressed; valves plane, each with 1 or 3 longitudinal veins, seeds in a single row in each cell, mostly margined, cotyledons accumbent or oblique. Flowers white. Figs. 336, 506.

* Leaves (all or at least the radical) pinnatifid. Stems clustered............Nos. 1, 2, 3
* Leaves all undivided, toothed or entire, often clasping..(*a*) (*Exotic.* No. 10.)
a Siliques short (6—12′′) and straight. Sds. not winged. Stems clustered..Nos. 4, 5
a Siliques longer (1—2′), straight or curved. Sds. not winged. St. simple..Nos. 6, 7
a Siliques long (3′), curved, pendent. Seeds winged.......................Nos. 8, 9

1 **A. Ludoviciàna** Meyer. All the leaves pinnatifid or pinnate, smoothish; stems branched at base; siliques ascending; seeds bordered. ① South. 6—10′. March.

2 **A. lyràta** L. Upper leaves smooth, linear, entire; radical leaves lyrately pinnatifid. often pilous; st. branched at base; pedicels spreading; siliques erect, seeds not bordered, obliquely =○. ② Hills, Can. to Va. 6—12′. Pods 1½—2′. Pet. 3′′ long. Apr., May.

3 **A. petræa** Lam. Upper leaves linear, entire, minute, radical pinnatifid, very small; stems clustered; pods ascending (1—1½′); seeds bordered, =○. ♃ Rocks (Greenwich), Ct., Vt., O., Mich. 6—12′. Flowers white or roseate. June.

4 **A. Thaliàna** L. St. clustered, erect; lvs. pilous, oblong, nearly entire; pet. twice longer than calyx; pods erect, squarish (9′′); seeds obliquely ‖○. ② Fields, Vt. to Ill. and Car. (Wayne Co., N. Y. Hankenson.) 4-12′. Fls. small. May. (Sisymbrium, Gay.) §

5 **A. dentàta** T. & G. Stems clustered, diffuse; lvs. oblong, sharply toothed; petals hardly longer than the calyx; pods spreading. ① N. Y. to Mo. 1f. Fls. small. May.

6 **A. pàtens** Sull. Erect, pubescent; cauline leaves coarsely toothed; siliques spreading and curved upward, beaked with a distinct style. ② O. to Tenn. 1—2f. May.

7 **A. hirsùta** Scop. Erect, hirsute; radical leaves oblong-ovate, cauline lanceolate, sagittate-clasping, entire or toothed; siliques straight, erect; style none. ② Can. to Va., and W. 1—2f. June.

8 **A. lævigàta** DC. Tall, glaucous, smooth; stem leaves linear-lanceolate and linear, sagittate-clasping, the upper entire; siliques very long, linear, at length spreading and pendulous. ② Can. to Tenn., and W. 2f. Pod 3′. May.

β. ***minor*** (Porter). Plant smaller, 10—15′, with the lvs. sessile—not clasping. Penn.

9 **A. Canadénsis** L. *Sickle-pod.* Tall, pubescent; stem leaves lanceolate, pointed both ways, sessile; silique subfalcate, veined, pendulous. ② Rocky hills. 2—3f. Petals small, but twice longer than sepals. Pods 3′. May, June.

10 **A.** ALPÌNA. Erect, 8—12′, hoary with stellate hairs; lvs. oblong, with slender teeth, clasping; fls. showy, pure wh., in many little long-stalked corymbs. Alps. Mar.—May.

5. **CARDAMÌNE**, L. BITTER CRESS. Calyx a little spreading. Silique linear or lanceolate, with flat, veinless valves narrower than the dissepiment, and often opening elastically from the base. Stigma entire. Seeds not margined, =○. Flowers white or purple.

§ DENTÀRIA. Pod lance-linear. Rhizome thickish, knotted. Stem with 2 or 3 palmated leaves near the middle. Flowers large, corymbed...(*)
* Leaves of the stem subopposite or subverticillate....................Nos. 1, 2, 3
* Leaves of the stem alternate..Nos. 4, 5

§ CARDAMÌNE. Pod linear. Root tuberous or fibrous. Leaves alternate...(†)
† Leaves pinnate, with many leaflets...Nos. 6, 7
† Leaves simple or partly ternate...(*a*)
a Siliques pointed with a slender style. In low, wet grounds.........Nos. 8, 9
a Siliques tipped with the sessile stigma. In high mountains.......Nos. 10, 11

1 **C. diphýlla.** Stem 2-leaved; leaflets subovate; rhizome continuous, toothed. ♃ Damp woods, Can. to Car. 1f. Leaves 3-parted, nearly opposite. Root-stock pungent, aromatic. May.

2 **C. laciniàta.** Cauline lvs. 3, 3-parted, the divisions lanceolate or linear-oblong, obtuse, lobed, toothed or entire; rhizome moniliform. ♃ Woods. 1f. Apr. May.

3 **C. multífida.** Cauline lvs. mostly 3, and verticillate, rarely 2, multifid with numerous linear lobes; rhizome tuberous. ♃ Woods, N. Car. to Ala. Rare. 9′.

4 **C. máxima.** Stem about 3-leaved (2 to 7); lfts. 3, ovate, toothed or cleft; rhizome moniliform, the tubers toothed. ♃ N. Y. and Penn. Rare. 1—2f. May.

5 **C. heterophýlla.** Stem about 2-leaved (2 or 3), leaflets 3, lanceolate and nearly entire; root-lvs. of 3 ovate-oblong, toothed, and cut-lobed leaflets; rhizome moniliform, scarcely toothed. ♃ Penn. Va. Ky. 6′. Flowers purple. June.

6 **C. hirsùta** L. Stem (hirsute in Europe) glabrous, erect; leaves pinnately 5–11-foliate, terminal leaflet largest; flowers (white) small, silique erect, linear or filiform; stigma minute, sessile. ② Wet. Variable. Stem 3—12′, slender or thick. Leaflets obtuse. Pod 1′. March—June.

β. ***sylvática.*** Slender and delicate; leaflets 1 or 2-toothed; pods filiform, incurved. Grows in dryer places. 6′. (C. Virginica Mx.)

7 **C. praténsis** L. *Cuckoo Flower.* Stem ascending, simple; leaves pinnately 7–15-foliate; leaflets petiolate, subentire, lower ones suborbicular, upper linear-lanceolate: style distinct. ♃ Swamps, N. Y. to Arc. Am. 10—16′. Flowers large. Apr. May.

8 **C. rhomboìdea** DC. Stems simple, erect or ascending, tuberiferous at base; siliques linear-lanceolate; rt. lvs. roundish, entire, st. lvs. rhomboidal. ♃ May. 8—14′.

β. ***purpurea.*** Slender, erect, few-leaved and purple-flowered. N. Y., O., Wisc.

9 **C. rotundifòlia** Mx. Stems decumbent, branching, finally stoloniferous; leaves all petiolate; pod linear-subulate; rt. fibrous. ♃ Cool springs, Pa. to Car. 1—2f. May, Jn.

10 **C. bellidifòlia** L. Leaves smooth, orbicular-ovate, nearly entire, petiolate; cauline entire or 3-lobed; siliques erect. ♃ White Mts. &c. 1½—3′. July.

11 **C. spatulàta** Mx. Lvs. hirsute, the radical spatulate, petiolate; cauline sessile, siliques spreading. ① Mts. of Car. and Ga. Trailing. 6—8′. April.

6. LEAVENWÓRTHIA, Torr. (Named for *Dr. Leavenworth,* the discoverer.) Petals cuneate, retuse, or truncate. Silique flat, oblong, valves indistinctly veined. Seeds in a single row, flattened, wing-margined. Embryo nearly straight, curving toward an accumbent form. ② Low, smooth herbs with lyrate-pinnatifid leaves. Pet. yellow at base.

L. Michaùxii (and aurea) Torr.—Rocks, Ky. to Tex. 2—6′. Lvs. mostly radical. Fls. 1—4.

7. MATTHǏOLA, R. Br. STOCK. (In honor of *P. A. Matthioli,* physician to Ferdinand of Austria, and botanic author.) Calyx closed, 2 of the sepals gibbous at base. Siliques terete; stigmas connivant, thickened or cornute at the back. Herbaceous or shrubby, oriental plants, clothed with a hoary, stellate pubescence.

1 **M.** INCÀNA. *Common Stock. Brompton S. July-flower.* Erect, branching from the woody base; lvs. lanceolate, entire. ② ♃ Eur. 2f. Fls. often double, white, purple.

2 **M.** ÁNNUA. *Ten-weeks Stock.* Erect, branched; lvs. lanceolate, obtuse, toothed. ① S. Eur. 2f. Flowers infinitely various, mostly double. June—Nov.

8. CHEIRÁNTHUS, L. WALL-FLOWER. (*Χειρ,* the hand, *ἄνθος,* flower.) Calyx closed, 2 of the sepals gibbous at base. Silique terete or compressed. Stigma 2-lobed or capitate. Seeds flat, in a single series, often margined. (=○). Garden perennials, mostly European. Leaves undivided. Fig. 55.

C. CHEÌRI. St. somewhat shrubby and decumbent at base; lvs. lanceolate, glabrous; pet. obovate, long-clawed, yellow; stig. capitate. ♃ S. Eur. 2f. June.

9. BARBǍREA, R. Br. WINTER-CRESS. (Dedicated to *Sta. Barbara.*) Sepals erect. Siliques columnar, 2 or 4-angled, valves carinate with a mid-vein. Seeds in a single row (═ ○). Leaves lyrate-pinnatifid. Fls. yellow.

1 **B. vulgàris** R. Br. Upper lvs. toothed or pinnatifid at base; siliques obtusely 4-angled, pointed with the style. ② Brooksides: common. 1—2f. Racemes dense, showy-panicled. Pod 9″. May, June.

2 **B. prècox** R. Br. *Scurvy-grass.* Upper lvs. pinnatifid, with the lobes all linear-oblong; silique 2-edged. ♃ § ‡ South. Pod 2—3′. May, June.

10. ERÝSIMUM, L. FALSE WALL-FLOWER. ('Ερύω, to cure; from its salutary medicinal properties.) Calyx closed. Siliques columnar, 4-sided, valves with a strong mid-vein. Stigma capitate. Seeds in a single series. Cotyledons oblong, ‖ ○. Lvs. narrow, undivided. Fls. yellow.

1 **E. cheiranthoìdes** L. Pubescence minute, appressed, branched; lvs. lanceolate, denticulate, or entire; fls. small; siliques short (8—10″), on slender, spreading pedicels; stig. small, nearly sessile. ① Wet grounds. 1—2f. Rac. long. July.

2 **E. Arkansànum** N. *Yellow Phlox.* Simple, scabrous; lvs. linear-lanceolate, remotely dentate; rac. corymbed at top; pod long (3′), erect; stig. capitate. ② Bluffs, O. to Ark. 2—3f. Flowers large, orange-yellow. June, July.

3 **E. orientàle** R. Br. Glabrous and glaucous; radical lvs. obovate, stem lvs. cordate-clasping, obtuse, entire; fls. white. ① Near Phila (A. H. Smith). § Eur.

11. SISÝMBRIUM, Allioni. (An ancient Greek name.) Calyx half-spreading, equal at base. Petals unguiculate, entire. Silique subterete, valves concave, marked lengthwise with 1—3 veins. Style very short. Seeds in a single series, ovoid, ‖ ○. Flowers small, yellow.

1 **S. officinàle** Scop. *Hedge Mustard.* Leaves runcinate; racemes slender, virgate; siliques subulate, erect, closely appressed to the rachis. ① A common weed, with branches at right angles. 1—3f. June—Sept. §

2 **S. Sòphia** L. *Flixweed.* Lvs. bipinnatifid, lobes linear-oblong, acute; sep. longer than pet.; pod linear, erect, longer than the spreading pedicel. ① N. Y. Can. §

3 **S. canéscens** Nutt. *Tansey Mustard.* Lvs. bipinnatifid, canescent, lobes oblong, subdentate, obtuse; pet. about equalling the calyx; pod oblong-linear, 3—6″, ascending, shorter (or never longer) than the spreading pedicel. ① U. S. 1—2f. Mar.—June.

12. WÀREA, N. (Named for *Mr. Ware,* the discoverer.) Sep. colored, ligulate. Pet. with very slender claws. Silique flattened, long and slender, raised on a slender stipe. Cotyledons oblong, ‖ ○. ① Glabrous, entire-leaved. Flowers white or purple, in short racemes. Siliques curved and declinate.

1 **W. cuneifòlia** N. Lvs. oblong, obtuse, cuneate at base, and subsessile. Ga. Fla. 1—2f. Pet. obovate, white. September.

2 **W. amplexifòlia** N. Lvs. oblong-ovate, partly clasping. Sand hills, Fla. 1—2f. Pet. oval, purple. September.

13. HÉSPERIS, L. ROCKET. ('Εσπερα, evening, when the flower is most fragrant.) Calyx closed, shorter than the claws of the petals. Pet. bent obliquely, linear or obovate. Silique subterete. Seeds not margined. Stig. forked, with the apices converging (‖ ○). Flowers white or purple.

H. matronàlis L. Simple, erect; lvs. lance-ovate, denticulate; pet. obovate; pod torulous, elongated (3′), erect. ② Shores of L. Erie (Hankenson) and Huron. § †

14. **SCHIZOPÉTALON,** Sims. (Σχιζω, to cut, as the petals appear to be.) Sep. erect. Pet. pinnately lobed, involute in the bud. Silique linear, compressed. Stig. lobes erect, connate. Seeds oblong or globular, cotyl. twisted (‖ ○). ① Lvs. sinuate-pinnatifid. Fls. white or purple.

S. WÁLKERI. Stem slender, erect, branching, 2f. Lvs. canescent. Fls. racemed. Chili. Raised from seed. Flowers large, curious, soon perishing.

15. **BRÁSSICA** (and Sinapis) L. CABBAGE, MUSTARD, &c. (The ancient names.) Silique long, terete, or 4-sided, pointed with a stout style or an ensiform 1-seeded beak. Valves 1–3-veined. Seeds in 1 row, globular, ((○. Root lvs. pinnatifid. Rac. elongated. Fls. yellow. Figs. 239, 192, 429.

§ SÍNAPIS. Sep. spreading. Pet. ovate. Pod with an acute beak.........Nos. 1, 2, 3
§ BRÁSSICA. Sep. erect. Pet. obovate. Pod squarish, with a blunt style...Nos. 4, 5, 6

1 **S. nìgra** L. *Black Mustard.* Smooth; pod 1′, smooth, somewhat 4-angled, appressed to the rachis, and beaked with a slender, 4-sided style. ① 3—6f. §

2 **S. arvénsis** L. *Field Mustard.* St. and lvs. hairy; pod 1½′, smooth, many-angled, torulous, spreading, thrice longer than the slender ancipital style. ① § June, July.

3 **S. álba** L. *White Mustard.* Lvs. smoothish; siliques hispid, torulous, shorter than the ensiform beak; seeds large, pale yellow. ① Eur. 3—5f. Pod 4-seeded.

4 **B. campéstris** L. *Cale.* Lvs. somewhat fleshy and glaucous, the lower lyrate-dentate, subciliate, upper cordate-amplexicaul, acuminate. ① Fields. 2f. July. §

β. ***Rutabàga.*** *Swedish Turnip.* Root tumid, napiform, subglobous, yellowish. ‡

5 **B. Rápa** L. Radical lvs. lyrate, rough, not glaucous, cauline ones incised, upper entire, smooth.

β. DEPRÉSSA. *Common Turnip.* Root depressed, globous or napiform, contracted below into a slender radicle. ② Long cultivated for its root. ‡

6 **B.** OLERÀCEA L. *Cabbage.* Lvs. very smooth and glaucous, fleshy, repand-toothed or lobed. ② Europe, on rocky shores, forming no head.

β. BULLÀTA. *Savoy Cabbage.* Lvs. curled, subcapitate, finally expanding. ‡

γ. BOTRYTIS-CAULIFLÒRA. *Cauliflower.* Stem low; heads thick, compact, terminal; flowers abortive, on short, fleshy peduncles. ‡

δ. BOTRYTIS ASPARAGOÌDES. *Broccoli.* Stem taller; heads subramous; branches fleshy at the summit, consisting of clusters of abortive flower-buds. ‡

ε. CAPITÀTA. *Head Cabbage.* Stem short; leaves concave, packed in a dense head before flowering; raceme paniculate. ‡

16. **ALÝSSUM,** L. MADWORT. (Gr. α, privative, λύσσα, rage; supposed by the ancients to allay anger.) Calyx equal at base. Pet. entire: some of the stamens with teeth. Silicle orbicular or oval, with valves flat, or convex in the centre. Seeds 1—4 in each cell (═ ○). Showy European herbs, half shrubby at base.

1 **A. marìtimum** Lam. *Sweet A.* Lvs. lance-linear, acute, entire, some hoary; pods oval, smooth, 2-seeded; fls. white, small, sweet. ♃ 1f. Escaped from gardens. §

2 **A. calycìnum** L. Calyx persistent; lvs. linear-spatulate, canescent; pods orbicular, lens-shaped, with a thin border, 4-seeded; fls. yellowish. ① 1f. Fields: rare. Mass. N. Y. (Wayne Co., Hankenson). §

3 **A.** SAXÁTILE. *Rock A.* Lvs. lanceolate, entire, downy; pods round-obovate, 2-seeded; flowers yellow, corymbed, abundant and brilliant. ♃ Candia. 9′. April.

17. **LUNÀRIA,** L. HONESTY. (Lat. *luna*, the moon; from the broad, round silicles.) Sep. somewhat bisaccate at base. Pet. nearly entire. Stam. without teeth. Silicle pedicellate, elliptical, or lanceolate, with flat

valves; funiculus adhering to the dissepiment (=○). European. Leaves cordate. Flowers lilac.

1 **L.** REDIVÌVA L. *Perennial Satin-flower.* Lvs. ovate, petiolate, mucronately serrate; silicles lanceolate, narrowed at each end. ♃ 2—3f. June.

2 **L.** BIÉNNIS DC. *Honesty.* Lvs. with obtuse teeth; silicles oval, obtuse at both ends. ② Flowers large, purple. May, June.

18. **DRĂBA,** L. WHITLOW GRASS. (*Δράβη,* acrid, biting; from the taste of the plant.) Calyx equal at base. Pet. equal. Fil. without teeth. Silicle oval or oblong, entire, the valves flat or slightly convex, veined. Seeds not margined, 2-rowed in each cell (=○). Flowers white, rarely yellow. Plants small.

§ ERÓPHILA. Petals 2-parted...No. 1
§ DRÀBA *proper.* Petals entire or only emarginate. (*a*)
  a Style distinct, long or short. Pods twisted when ripe. Perenn..Nos. 2, 3, 4
  a Style none. Pods straight, plane. Plants annual or bienn. (*b*)
    b Pedicels as long as or longer than the pods.................Nos. 5, 6
    b Pedicels shorter than the pods...........................Nos. 7, 8

1 **D.** (**Erópbila**) **vérna** L. *Whitlow Grass.* Scape naked; lvs. oblong, acute, subserrate, hairy; pet. bifid; stig. sessile; silicle oval, flat, shorter than the pedicel. ① A little Spring flower, in rocky places. Can. to Va. 1—3′.

2 **D. ramosíssima** Desv. Minutely pubescent, diffuse; lvs. linear-lanceolate, with remote and slender teeth; rac. panicled; silicle lanceolate, about the length of the pedicel, the style half as long. ♃ Va. Ky. 5—8′. May.

3 **D. arábisans** Mx. Slightly pubescent; root leaves in tufts, wedge-lanceolate, toothed; stems leafy, erect, its lvs. oblong; silicle glabrous, lance-oblong (6″), spreading; style very short. ♃ Lake shores, Vt. N. Y. Mich. 6—10′. White. May.

4 **D. incàna** L. Hoary pubescent; root leaves in tufts, wedge-lanceolate, slightly toothed; st. nearly naked, branches and ped. very erect; silicle oblong (5″), twisted, sty. very short. ♃ or ② Mts. N.Vt. and N. 6—8′. Lvs. 6″. Fls. very small, white. June.

5 **D. nemoràlis** Ehrh. Pubescecnt, branched; lvs. oval, the cauline lanceolate, toothed; pet. emarginate; silicles half the length of the spreading pedicels. ② Mich. Mo. 8—10′. Flowers small, white or yellowish. May.

6 **D. brachycárpa** N. Minutely pubescent; lvs. ovate, the cauline oblong; rac. ∞-flowered; pet. obovate, entire; silicle as long as the ped. 6-seeded. ① Mo. and South. 3—4′. Pod 2″. April.

7 **D. cuneifòlia** N. Hirsute, pubescent, branching and leafy below, naked above; lvs. cuneate-oblong, sessile, denticulate; rac. elongated in fruit; silicles twice longer (4″) than the pedicels. ① Ky. to La. 3—8′. March.

8 **D. Caroliniàna** Walt. Hispid, branching and leafy below, naked above; lvs. entire, obovate and oval; rac. short; silicles oblong-linear, longer than the pedicels (5″). ① R. I. to Ga. and W. 1—3′. Much like No. 7. April—June.

β. ***micrántha.*** Silicles minutely hispid; pet. oftèn wanting. (D. micrantha N.) W.

19. **ARMORÀCIA,** Rupp. HORSE-RADISH. (*Armorica,* its native country, now the province Brittany, France.) Sep. spreading. Pet. entire, much exceeding the calyx. Silicles ellipsoid or globular, turgid, 1-celled from the incomplete partition. Style distinct. Seeds few (=○). ♃ Lvs. oblong, undivided, or the lower pinnatifid. Flowers white.

1 **A. rusticàna** Rupp. Radical lvs. oblong, crenate; cauline long, lanceolate, incised; silicle roundish, ellipsoid, much longer than the style. § Eur.

2 **A. Americàna** Arn. Aquatic; immersed lvs. doubly pinnatifid with capillary segments, emersed, oblong, pinnatifid, serrate or entire; silicle ovoid, little longer than the style. Lakes and rivers, Can. to Ky. July, Aug.

20. **VESICÀRIA,** Lam. BLADDER-POD. (Lat. *vesica*, a bladder or blister; from the inflated silicles.) Pet. entire. Silicle globous or ovoid; inflated valves nerveless, hemispherical or convex. Seeds several in each cell, sometimes margined (= ○). Flowers yellow.

V. Shórtii T. & G. Lvs. elliptical, sessile, entire; style twice as long as the globous silicle; seeds 2—4, not margined. ① Ky. rare.

21. **CAMELÌNA,** Crantz. FALSE FLAX. (*Χαμαὶ*, dwarf, *λίνον*, flax.) Calyx equal at base. Pet. entire. Silicle obovate or subglobous, with ventricous valves and many-seeded cells. Styles filiform, persistent. Seeds oblong, striate, not margined (‖ ○). Flowers small, yellow.

C. satìva Crantz. Lvs. lanceolate, sagittate at base, subentire; silicle obovate-pyriform, margined, tipped with the pointed style. ① Fields. § Eur. 2f. June.

22. **SUBULÀRIA,** L. AWLWORT. (Named in reference to the linear-subulate leaves.) Silicle oval, valves turgid, cells many-seeded. Stigma sessile; cotyledons linear, curved and incumbently folded on themselves. ① Aquatic acaulescent herbs.

S. aquática L.—Shores of ponds, Me. N. H. Lvs. all radical, entire, subulate, 1′. Scape 2—3′, with a few minute white flowers. July.

23. **ÌBERIS,** L. CANDYTUFT. (Most of the species are natives of *Iberia*, now Spain.) The 2 outside petals larger than the 2 inner. Silicles compressed, truncate, emarginate, the cells 1-seeded. Handsome herbs from the Old World, pretty in cultivation. Flowers white or purple.

1 **I.** UMBELLÀTA. *Purple C.* Herbaceous; lvs. lin.-lanceolate, acuminate, the lower serrate; silicles umbellate, acutely 2-lobed. ① Eur. 1f. Purple. June, July.
2 **I.** AMÀRA. *Bitter C.* Herbaceous; lvs. lanceolate, acute; fls. finally racemed; silicles obcordate, narrowly emarginate. ① Eng. 1f. White. June, July.
3 **I.** ODORÀTA. Herbaceous; lvs. linear, toothed, dilated at end; silicle round, with acute, spreading lobes. ① Alps. 1f. Sweet scented. Foliage pretty. July.
4 **I.** PINNÀTA. Lvs. pinnatifid, smooth. ① Eur. 1f. White, corymbed.
5 **I.** SAXÀTILIS. Shrubby; lvs. linear, entire. ♃ Eur. 1f. White, corymbed.

24. **CAPSÉLLA,** Vent. (Lat. *capsa*, a chest or box; alluding to the fruit.) Calyx equal at base; silicles triangular-cuneiform, obcordate, compressed laterally; valves carinate, not winged on the back; septum sublinear; style short; seeds ∞, oblong, small, ‖ ○. Fls. white. A common weed. Fig. 193.

C. Bursa-pastòris Mœnch. *Shepherd's Purse.* ① Grows everywhere. 6′—1f—2f. Root lvs. rosulate, cut-lobed; stem leaves lance-lin. clasping-sagittate; rac. long.

25. **LEPÍDIUM,** R. Br. PEPPER GRASS. (*Λέπις*, a scale; from the resemblance of the silicle.) Sepals ovate; petals ovate, entire; silicles oval-orbicular, emarginate; septum very narrow, contrary to the greater

diameter; valves carinate, dehiscent; cells 1-seeded. Cotyledons ‖o, often =o. Flowers small, white, often incomplete.

* Stamens only 2. Petals often wanting. Leaves not clasping..... ....Nos. 1, 2
* Stamens 6. Silicles evidently winged..Nos. 3, 4

1 **L. Virgínicum** L. *Tongue-grass.* Lvs. linear-lanceolate, the lower incisely serrate; pet. 4; silicles orbicular, emarginate; cotyledons =o. ① Dry places. 1f.

2 **L. ruderàle** L. Cauline lvs. incised, those of the branches entire; pet. none; pods broad-oval, notched, wingless. ① Dry fields. Rare. 10—15′. Always apetalous. §

3 **L. campéstre** R. Br. *Yellow-seed.* Cauline lvs. sagittate-clasping, denticulate; silicles ovate, notched, winged, rough. ① Dry fields. Rare. 6—10′. Jn. § Eur.

4 **L.** SATÌVUM L. *Pepper-grass.* Lvs. oblong, variously incised and pinnatifid; silicles elliptic-ovate, notched and winged. ① Eur. 2f. A garden salad. July.

26. SENEBIÈRA, Poir. CARPET CRESS. SWINE CRESS. (In honor of *Senebier*, a distinguished vegetable physiologist.) Silicle didymous, with the partition very narrow; valves ventricous, separating but indehiscent, and each 1-seeded, cotyledons incumbently folded on themselves. ① or ② Prostrate and diffuse, with minute white flowers.

1 **S. dídyma** Pers. Lvs. pinnate, with pinnatifid segments; silicles rugously reticulated, notched at the apex. Waste places coastward, Atlantic and Pacific.

2 **S. Coronòpus** DC. Lvs. pinnate, with the segm. entire, toothed, or pinnatifid; silicles tubercled, not notched at apex. R. Isl. (Robbins) to Car. Rare.

27. ISÀTIS, L. WOAD. (Ἰσάζω, to make equal; supposed to remove roughness from the skin.) Silicle elliptical, flat, 1-celled (dissepiment obliterated), 1-seeded, with boat-shaped valves, which are scarcely dehiscent (‖o). None North American.

I. TINCTÒRIA L. Silicles cuneate, acuminate at base, somewhat spatulate at the end, very obtuse, three times as long as broad. ① Eng. 4f. Yellow. May—July. Cultivated for the dye which is yielded by its leaves.

28. CAKÌLE, Tourn. SEA ROCKET. (Named from the Arabic.) Silicle 2-jointed, the upper part ovate or ensiform; seed in the upper cell erect, in the lower pendulous, sometimes abortive. ① Maritime, fleshy herbs. Flowers purple.

C. marítima Scop. Lvs. oblong, bluntly serrate, obtuse, often lobed; lower joint of silicle clavate, upper ovate-ensiform: racemes spike-like. Coasts, N. States. Prostrate. 6—12′. July, August.

29. RÁPHANUS, L. RADISH. (Ῥὰ, quickly, φαίνω, to appear; from its rapid growth.) Calyx erect. Pet. obovate, unguiculate. Siliques terete, torulous, not opening by valves, transversely 2-jointed, joints with 1 or several cells. Seeds large, subglobous, in a single series (o.

1 **R. Raphanístrum** L. *Wild Radish.* Lvs. lyrate; silique moniliform. 3-8 seeded, becoming in maturity 1-celled, longer than the style. ① Fields: rare. 1—2f. Pet. yellow, blanching as they decay. June, July. § Eur.

2 **R.** SATÌVA L. *Garden Radish.* Lower lvs. lyrate, petiolate; silique 2-3-seeded, acuminate, scarcely longer than the style. ① China. 2—4f. Root napiform or fusiform, red, black, or white. Flowers pink-white.

ORDER XII. CAPPARIDACEÆ. CAPPARIDS.

Herbs, *shrubs*, or even *trees*, destitute of true stipules. *Leaves* alternate, petiolate. *Flowers* cruciform, hypogynous. *Sepals* 4, *Petals* 4, unguiculate. *Stamens* 6—12, or some multiple of 4, never tetradynamous, on a disk or separated from the corolla by an internode of the torus. *Ovaries* often stipitate, of 2 united carpels. *Style* united. *Fruit* either pod-shaped and dehiscent, or fleshy and indehiscent. *Seeds* many, reniform. *Albumen* 0. *Embryo* curved. *Cotyledon* foliaceous.

§ TRIBE CAPPAREÆ. Shrubs (or trees) with baccate or drupaceous fruit. S. Fla...CAPPARIS.
§ TRIBE CLEOMEÆ. Herbs (or shrubs) with capsular 1-celled pods. (*a*)
a Stamens 6, separated from the petals by an internode........................GYNANDROPSIS. 1
a Stamens 6, not separated from the petals..CLEOME. 2
a Stamens 8—32, free. Torus not developed to an internode..................POLANISIA. 3

1. GYNANDRÓPSIS, DC. (*Gynandria*, a Linnæan class, *ὄψις*, appearance.) Sep. distinct, spreading. Stam. 6, separated from the 4 petals by a slender internode of the torus. Pod linear-oblong, raised on a long stipe which rises from the top of the torus. ① Lvs. digitate. Fls. racemed.

G. pentaphýlla DC. Middle lvs. petiolate, 5-foliate, floral and lower ones 3-foliate, leaflets obovate, entire, or denticulate. Waste grounds, Va. to Ga. 2—3f. White. §

2. CLEÒME, L. SPIDER FLOWER. Sep. sometimes united at base. Pet. 4. Torus not developed between the petals and the stamens, which are 6—4. Pod stipitate more or less. Herbs or shrubs. Lvs. simple or digitate. Flowers racemed or solitary.

1 **C. púngens** L. Stem simple, prickly; lfts. 5—9, elliptic-lanceolate, acute; flowers racemed; petals on filiform claws, half as long as the stamens. ② Gardens and fields. 3—4f. Flowers purple, curious. May—Aug. §

2 **C.** SPECIOSÍSSIMA. Stem branched below; lfts. 5—7, lanceolate, acuminate; petals as long as their claws, rose-purple. Mexico. 3—4f. June—Sept.

3. POLANÍSIA, Raf. (*Πολύ*, much, *ἄνισος*, unequal.) Sep. distinct, spreading. Pet. 4, unequal. Stam. 8—32, filaments filiform or dilated at the summit. Torus not developed, minute. Pods linear. ① Strong-scented herbs, with glandular, viscid hairs.

1 **P. gravèolens** Raf. Viscid-pubescent; lvs. ternate, lfts. elliptic-oblong; fls. axillary, solitary; stam. 8—12; caps. oblong-lanceolate, attenuate at base. Gravelly shores, Vt. to Ark. 1f. Flowers in leafy racemes, yellowish-white. July.

2 **P. tenuifòlia** T. & G. Viscid-glandular; lfts. 3, filiform-linear; pet. unequal, oval, on short claws; stam. 12—15; pod linear. Ga. Fla. 1—2f. White.

ORDER XIII. RESEDACEÆ. MIGNONETTES.

Herbs, with alternate, entire, or pinnate leaves. *Stipules* minute, gland-like. *Flowers* in racemes or spikes, small and often fragrant, 4-7-merous, unsymmetrical and open in bud. *Petals* unequal, entire or cleft. *Stamens* 8—20, inserted on the hypogynous, one-sided glandular disk. *Ovaries* sessile, 3-lobed, 1-celled, many-seeded. *Fruit* a capsule, 1-celled, opening between the stigmas before maturity. Illust. 40, 165.

RESÈDA, L. (Lat. *resedo*, to calm: the plants are said to relieve pain.) Sep. 4—7. Pet. of an equal number, often cleft. Torus large, fleshy, one-sided, bearing the 8—∞ stamens.

1 **R. lutèola** L. *Dyer's Weed.* Lvs. lanceolate, with a tooth on each side at base; sepals 4, united below; petals (greenish-yellow) 3-5-cleft. ① Roadsides, N. Y. 2f. Flowers numerous, in a tall raceme. § Eur.

2 **R.** ODORÀTA L. *Mignonette.* Lvs. cuneiform, entire or 3-lobed; sepals shorter than the 7-13-cleft petals. Egypt. 1f. Fragrant.

ORDER XIV. VIOLACEÆ. VIOLETS.

Herbs with simple (often cleft) alternate leaves with stipules. *Flowers* irregular, spurred, with the sepals, petals, and stamens in 5's. *Sepals* persistent, slightly united, elongated at base, the 2 lateral interior. *Petals* commonly unequal, the inferior usually spurred at base. *Stamens* 5, usually inserted on the hypogynous disk. *Filaments* dilated, prolonged beyond the anthers. *Ovary* of 3 united carpels, with 3 parietal placentæ. *Style* 1, declinate. *Stigma* cucullate. *Fruit* a 3-valved capsule. *Seeds* many, with a crustaceous testa and distinct chalaza. Illust. 50, 93, 137, 302, 515, 522.

Sepals not auricled at base. Filaments united into a tube..............................SOLEA. 1
Sepals more or less auriculate at base. Filaments scarcely cohering....................VIOLA. 2

1. **SÒLEA,** Gingins. GREEN VIOLET. (Dedicated to *W. Sole*, an English writer on plants.) Sep. nearly equal, not auriculate. Pet. unequal, the lowest 2-lobed and gibbous at base, the rest emarginate. Stam. united into a tube, sheathing the ovary and bearing a gland above the middle. Sds. 6—8, very large. ♃ An erect, leafy plant, with inconspicuous axillary fls.

S. cóncolor Gingins. *Green Violet.*—Woods. W. N-Y. (Hankenson) to Car. and Mo. 1—2f. Lvs. large, lanceolate, acuminate. Fls. greenish. Pod 1′. May, June.

2. **VÌOLA,** L. VIOLET. PANSEY. (From the Latin.) Sep. 5, unequal, auricular at base. Pet. 5, irregular, the broadest spurred at base, the 2 lateral equal, opposite. Stam. approximate, anthers connate, 2 of them with appendages at the back. Caps. 1-celled, 3-valved, seeds attached to the middle of the valves. ♃ Low, herbaceous plants. Ped. angular, solitary, 1-flowered, recurved at the summit so as to bear the flowers in a resupinate position. Joints of the rhizome often bearing apetalous flowers. Figs. 50, 137, &c.

§ Acaulescent.—*a* Petals yellow..No. 1
—*a* Petals white..Nos. 2, 3, 4
—*a* Petals blue,—*b* beardless..Nos. 5, 6, 7
—*b* bearded.—*c* Lvs. divided..................Nos. 8, 9β, 9γ
—*c* Lvs. undivided....9, 10, 11, and the Exot. 19

§ Caulescent.—*d* Petals yellow. Stems leafy at the top only................Nos. 12, 13, 14
—*d* Petals not quite yellow.—*e* Stipules entire..........................No. 15
—*e* Stipules fringe-toothed........Nos. 16, 17, 18
—*e* Stip. lyrate-pinnatifid, very large..Nos. 20-22

1 **V. rotundifòlia** Mx. Fig. 50. Lvs. smooth, orbicular-ovate, cordate, with the sinus closed; petiole pubescent; sep. obtuse. Woods, N. E. to Tenn. Mar.—May.

2 **V. lanceolàta** L. Lvs. smooth, lanceolate, tapering at base into the long petiole, obtusish, subcrenate. Wet meadows. Lvs. 3—5′. Rt. stock creeping. Fls. white. May.

3 **V. primulæfòlia** L. Lvs. lance-ovate, abruptly contracted at base and decurrent on the petiole; pet. subequal, beardless. Damp soils, Mass. S. and W. White. Ap. May.

4 **V. blánda** Willd. Lvs. cordate, roundish, slightly pubescent; petiole pubescent; petals beardless. Meadows, Can. to Penn. Root creeping. Flowers fragrant. May.

5 **V. palústris** L. Lvs. reniform-cordate; stip. broadly ovate; sep. ovate, obtuse, spur very short; caps. oblong-triangular. White Mts. 3′. Pale blue. June.

6 **V. Selkírkii** Goldie. Lvs. orbicular-cordate, crenately serrate, the sinus deep and nearly closed; spur nearly as long as the petals, thick, very obtuse. Hills, N. Y. to Can. and Mich. 2′. Pale blue, with a large blunt spur. May.

7 **V. pedàta** L. Rt. premorse; lvs. pedately 5—9-parted, segments linear-lanceolate, entire; stig. large, obtusely truncate, scarcely beaked; spur short, obtuse. Hilly woods, 4—7′. Smooth and beautiful. Flowers large, violet-blue. April, May.

β. ***bícolor.*** Upper petals violet, the lower pale blue and yellow. Mass. to Ga.

8 **V. delphinifòlia** Nutt. Lvs. pedately 7—9-parted, with linear, 2—3 cleft segments all similar; stig. thick, distinctly beaked. Ill. Iowa, Mo. Deep blue. Mar. Apr.

9 **V. cucullàta** Ait. Lvs. reniform-cordate, cucullate at base, acute, crenate; stip. linear; inferior and lateral petals bearded. Common everywhere. 3—12′. Known by its broad hooded leaves and blue flowers. Varies much. April, May.

β. ***palmàta.*** Lvs. cordate, hastate-lobed, middle lobe largest. Fls. large. South, &c.

γ. ***septemlòba.*** Lvs. concave at base, deeply 5—7 lobed, mid. lobe lance. South.

10 **V. villòsa** Walt. Lvs. roundish-ovate, cordate, obtuse, flat, pubescent, sinus narrow or closed; pet. bearded; stig. beaked. Woods, Pa. to Ga.; com. 2—3′. Apr.

11 **V. saggitàta** Ait. Lvs. oblong-lanceolate, sagittate-cordate, subacute, often incised at base, serrate-crenate; pedicel longer than the leaves; pet. densely bearded. Dry hills. 3—5′. Lvs. varying to triangular-hastate. April—June.

β. ***ovàta.*** Lvs. ovate, incised and decurrent at base. N. J., southward.

12 **V. hastàta** Mx. Smooth; st. simple, erect, leafy above; lvs. deltoid-lanceolate or hastate, acute, dentate; stip. ovate, minute, ciliate-dentate; lower pet. dilated, obscurely 3-lobed; spur very short. Fla. to Tenn. 6—10′. April, May.

13 **V. tripártita** Ell. Hairy. St. simple, erect, leafy above; lvs. deeply 3-parted, lobes lanceolate, dentate; stip. lanceolate. Upper Ga. 1f. Yellow.

14 **V. pubéscens** Ait. Villous-pubescent; st. erect, naked below; lvs. broad-cordate, toothed; stip. ovate, large, subdentate. Dry woods. 5—20′. May, June.

β. ***eriocárpa.*** Tall, pubescent; pods woolly. Westward.

γ. ***scabriúscula.*** Some scabrous; sts. decumbent, branched at base. Ct. to Ky.

15 **V. Canadénsis** L. Smooth; lvs. cordate, acuminate, serrate; ped. shorter than the leaves; stip. short, entire. Woods. 8—12′. Leafy all the way. Flowers large, subregular, white or light blue. Summer.

16 **V. striàta** Ait. Smooth, nearly erect; lvs. roundish-ovate, cordate, crenate-serrate; stip. large, ciliate-dentate, oblong-lanceolate; spur one-fourth as long as the corolla. Wet grounds. 6—12′. St. semi-terete. Flowers cream-white.

17 **V. Muhlenbérgii** Torr. St. weak, assurgent; lvs. reniform-cordate, upper ones rather acuminate; stip. lanceolate, somewhat fimbriate; spur half as long as the corolla, obtuse. Swamps. 6—8′. Pale purple. May.

18 **V. rostràta** L. Smooth; st. terete, diffuse, erect; lvs. cordate, roundish, serrate, upper ones acute; stip. lanceolate, deeply fringed; petals bearded; spur longer than the corolla. Moist woods, Can. to Ky. 6—8′. Pale blue. May.

19 **V.** ODORÀTA L. *Sweet, or English Violet. Neapolitan.* Stolons creeping; lvs. cordate, crenate, nearly smooth; sep. obtuse. Eur. Flowers fragrant, blue, white, &c.

20 **V. trícolor** L. *Pansey, Heartsease.* St. angular, diffusely branched; lvs. oblong-ovate, lower ones ovate cordate, deeply crenate; stipules as large as the leaves; spur short, thick. Gardens. Flowers large, white-yellow-violet to black, in endless variety.

β. ***arvénsis.*** Slender, subsimple; petals scarcely longer than sepals. Fields. Perhaps this is the primary form. Abundant in Oregon.

21 **V.** GRANDIFLÒRA L. Stem 3-cornered, procumbent; leaves crenate, shorter than the peduncles, much larger than the stipules; flowers large, all violet.

22 **V.** CORNÙTA. Stems 3-cornered, ascending; lvs. cordate, crenate; stip. cut-toothed; fls. violet-purp., the spur subulate, longer than the sepals. From the Pyrenees. Hardy.

ORDER XV. CISTACEÆ. ROCK ROSES.

Herbs or low *shrubs* with simple, entire, opposite (at least the lower) leaves, with *flowers* perfect, regular, hypogynous, in one-sided racemes, very fugacious. *Sepals* 5, unequal, persistent. *Petals* 5 (sometimes 3 or wanting), convolute in bud. *Capsules* 1-celled, 3–5-valved, with as many parietal placentæ. *Seeds* albuminous. *Embryo* curved or spiral.

¶ Petals 3, linear-lanceolate, small, brown-purple. Stamens 3—12.................... LECHEA. 1
¶ Petals 5,—*a* large, yellow, very fugacious, or none. Stamens ∞.................. HELIANTHEMUM. 2
—*a* small, bright yellow. Tufted shrublets. Stamens 9—30.............. HUDSONIA. 3

1. **LECHÈA**, L. PINWEED. Sep. 5, the 2 outer minute. Pet. 3, lanceolate, small. Stig. 3, scarcely distinct. Caps. 3-celled, 3-valved, placentæ nearly as broad as the valves, roundish, each 1–2-seeded. ♃ Often shrubby at base, with numerous very small brownish purple flowers.

1 **L. màjor** Mx. Hairy; leaves elliptical, mucronulate; flowers minute, about as long as the pedicels. In dry woods. 1—2f, rigid, brittle, purple, much branched. Leaves 4″. Capsules the size of a small pin-head. July, August.

2 **L. minor** Lam. Smoothish; leaves linear, very acute; flowers small, on pedicels which are mostly twice longer. Dry, sandy grounds. Stems 8—16′, slender, red. Leaves 6—10″. Capsules the size of a large pin-head. Summer.

3 **L. thymifòlia** Ph. Shrubby; hoary with appressed hairs; leaves linear and linear-oblanceolate, rather acute, often verticillate; flowers small, on pedicels still shorter. Coasts, Mass. to N. J. 1f. Very bushy. Capsules size of a pin-head. Sum.

4 **L. Nova-Cæsarèæ** Austin. Hairs minute, appressed; lvs. ellip., 6″, often opp.; pan. leafy, narrow; outer sep. lin., longer than the fl. or pedicels. N. J. (Prof. Porter).

2. **HELIÁNTHEMUM**, L. ROCK ROSE. Sep. 5, the 2 outer smaller. Pet. 5, or rarely 3, convolute contrary to the sepals, sometimes 0. Stam. ∞. Stig. 3, scarcely distinct. Capsules triangular, 3-valved, opening at top. Sds. angular. Fls. yellow, often of 2 kinds, the later ones being apetalous.

§ Flowers of 2 sorts, the later ones apetalous, and 3–10-androus.............. Nos. 1, 2
§ Flowers all alike, pentepetalous and polyandrous.......................... Nos. 3, 4

1 **H. Canadénse** Mx. *Frost Plant.* Hoary pubescent; petaliferous flowers solitary, pedicellate, terminal; apetalous axillary, small, clustered, subsessile; sepals acute; leaves revolute on the margin, lanceolate, acute. In dry soils, Can. to Va. 8—12′.

2 **H. corymbòsum** Mx. Canescently tomentous; fls. in crowded, fastigiate cymes, the primary ones on elongated, filiform pedicels, and with petals twice longer than the calyx; sep. obtuse; leaves oblong-lanceolate, margins revolute. Sands, N. J. to Fla. 1f

3 **H. Caroliniànum** Mx. Villous, simple, erect; fls. all large, petaliferous and subterminal; sepals acuminate; lvs. oblong-oval, edges denticulate, not revolute. Dry woods, South. 8—12′. April, May.

4 **H. arenícola** Chapm. Hoary-tomentous; lvs. lance-oblong, obtuse, small (9″); fls. few or solitary, pedicellate (7″), terminal. Fla. in sand. 3—6′. Apr. (H. Canadense, β. obtusum Wood. Ed. 5th.)

3. HUDSÒNIA, L. (In honor of *William Hudson*, author of Flora Anglica.) Sep. 3, united at base, subtended by 2 minute ones outside; pet. 5; sta. 9—30; style filiform, straight; cap. 1-celled, 3-valved, many-seeded. ♄ with very numerous branches, minute leaves, and small, bright yellow flowers. May.

1 **H. tomentòsa** Nutt. Hoary tomentous; lvs. ovate, appressed-imbricate, acute; fls. subsessile; sep. obtuse. Coasts, Me. to N. J. and Wisc. In tufts, 7—10′.

2 **H. ericoìdes** L. Hoary-pubescent; lvs. subulate, a little spreading; pedicels exserted, as long as the calyx; sep. acutish. Shores, Vt. N. H. to Va. Delicate, 6′.

3 **H. montàna** Nutt. Minutely pubescent; lvs. filiform-subulate; pedicels longer than the flowers; sep. acuminate, the outer ones longer, subulate. Mts. Car. 5′.

ORDER XVI. HYPERICACEÆ. ST. JOHN'S WORTS.

Herbs or *shrubs* with opposite, entire, dotted, exstipulate *leaves*, with *flowers* perfect, regular, hypogynous, 4 or 5-merous, cymous and mostly yellow; *sepals* unequal, persistent; *petals* mostly oblique or convolute in the bud; *stamens* few or many, polyadelphous; *anthers* versatile; *ovary* compound, with styles united or separate, becoming in *fruit* a 1-celled capsule with parietal placentæ, or 3 to 5-celled when the dissepiments reach the centre. *Seeds* exalbuminous, minute. (Illust. 128, 129, 275.)

§ Sepals 4. Petals 4, oblique, contorted in æstivation, yellow..........................ASCYRUM. 1
§ Sepals 5. Petals 5,—*a* oblique, contorted in æstivation, yellow..........................HYPERICUM. 2
— *a* equilateral, imbricated in bud, purplish..........................ELODEA. 3

1. ASCỲRUM, L. ST. PETER'S WORT. Sep. 4, the two outer usually very large and foliaceous; pet. 4, oblique, convolute; fil. slightly united at base into several parcels; styles 2—4, mostly distinct; cap. 1-celled. ♄ Lvs. punctate with black dots. Fls. pale yellow, 1 or 3 terminating each branch.

The outer pair of sepals—*a* very large, ovate. Styles 1 or 2..........................Nos. 1, 2
—*a* still larger, orbicular. Styles 3..........................Nos. 3, 4
—*a* small, like the two inner. Styles 3, long, distinct..........No. 5

1 **A. Crux-Andreæ** L. Branches many, suberect, ancipital above; lvs. linear-oblong, obtuse; outer sep. twice longer than the pedicel; 2 bracteoles a little below the flower. Sandy woods, N. J. to Ga. and La. 1—2f. Lvs. 6—12″. Jn.—Sep.

β. angustifòlia. Lvs. smaller (3—6″), crowded; bractlets close to the fl. Car. Ga.

2 **A. pùmilum** Mx. Low, trailing at base; lvs. oval and obovate, obtuse, sessile; outer sepals shorter than the slender pedicel, inner sepal 0; bracteoles 0. Ga. Fla.

3 **A. stans** Mx. St. erect, ancipital; lvs. oblong, sessile and half-clasping, obtuse; caps. ovate, acute. Swamps, N. J. to Fla. and La. 1 to 3f. Lvs 10—15″. Jn.—Aug.

4 **A. amplexicaùle** Mx. St. erect, terete below; lvs. broadly ovate, cordate, clasping; caps. oblong; bracteoles 0. Ga. and Fla. 1 to 2f. Lvs. 8—12″. Apr.—Sep.

5 **A. microsépalum** Torr. and Gr. Lvs. oblong-linear, crowded; sep. much shorter than the obovate, unequal petals. Bushy, 1—2f. Lvs. 3—6″.

2. HYPÉRICUM, L. St. John's-wort. Sep. 5, connected at base, subequal. Pet. 5, oblique, contorted in bud. Stam. mostly ∞, generally cohering in 3—5 sets (polyadelphous), with no intervening glands. Styles 3—5, distinct or united. Caps. 1–5-celled. Herbs or shrubs. Flowers cymous, yellow. June—August. Figs. 128, 129, 275.

§ Stamens 25—100, more or less united into sets (polyadelphous)...(*a*)
§ Stamens 5—15, not at all united. Annuals. Flowers small. (*g*)
a Carpels (and styles) 5 or more. Capsule 5-celled..........Nos. 1, 2
a Carpels 3, capsule 3-celled (the placentæ meeting)...(*b*)
a Carpels 3, capsule 1-celled (the placentæ not quite meeting)...(*c*)
b Shrubby. Petals not dotted. Lvs. lanceolate or oblanceolate..........Nos. 3, 4, 5
b Shrubby. Petals not dotted. Leaves linear..........Nos. 6, 7
b Herbaceous. Petals sprinkled with black dots..........Nos. 8, 9, 10
c Shrubs. Styles united into 1...(*d*)
c Half-shrubby. Styles united into 1...(*e*)
c Herbaceous. Styles distinct, at least at the top...(*f*)
d Flowers solitary or in 3's, axillary. Stems 2-edged..........Nos. 11, 12
d Flowers clustered in a compound terminal cyme..........Nos. 13, 14
e Flowers in a leafless, stalked cyme. Leaves obtuse..........Nos. 15, 16
e Flowers in a leafy (few-leaved) cyme. Leaves acute..........Nos. 17, 18
f Stem and branches 4-cornered or square..........Nos. 19, 20
f Stem and branches terete, not angular..........Nos. 21, 22
g Flowers in corymbous cymes, orange-colored..........Nos. 23, 24
g Flowers racemed on the slender branches..........Nos. 25, 26

1 **H. pyramidàtum** Ait. Herbaceous; lvs. sessile, oblong-ovate, acute; sty. 5; placentæ retroflexed. ♃ O. Pa. to Can. 3—5f. Flowers very large (2′).

2 **H. Kalmiànum** L. Shrubby; lvs. linear-lanceolate, very numerous, obtuse; caps. 5-celled, tipped with the 5 styles. Niagara, &c. 1f. Flowers 9″.

3 **H. Bucklèyi** Curtis. Low, diffuse, shrubby; lvs. obovate, very obtuse; fls. solitary, peduncled; caps. 3-celled, styles united. Mts. N. Car. to Ga. 8—12′.

4 **H. prolíficum** L. Branches ancipital, smooth; lvs. oblong-lanceolate, obtuse; cymes compound, leafy; sepals unequal, leafy, ovate, cuspidate. M. W. 3—4f. †

β. ***densiflòrum.*** Branches, lvs. and fls. crowded, and smaller. Lvs. 1′. Fls. 6″. South.

5 **H. galioìdes** Lam. Branches erect, terete; lvs. linear-lanceolate; cymules axillary and terminal, paniculate; sep. subequal, linear-lanceolate. S. Car. to Fla. 2—3f.

6 **H. rosmarinifòlium** Lam. Erect, sparingly branched; lvs. linear, shorter than the internodes, narrowed to a petiole. South. Handsome. 2f.

7 **H. fasciculàtum** Lam. Shrub much branched, bushy; lvs. linear, 1′, very narrow, longer than the internodes, sessile; cymules leafy. Pine-barrens, South. 1—2f.

β. ***abbreviàtum.*** Lvs. very short (2—3″), tufted in the axils. Car. to Ga.

8 **H. perforàtum** L. Stem 2-edged, branched; lvs. with pellucid dots; sep. lanceolate, half as long as the petals. ♃ Dry pastures. 1—2f. Lvs. 6—10″. Flowers 1′.

9 **H. corymbòsum** Muhl. Stems terete, corymbously branched; lvs. oblong-ovate or oval, obtuse, marked with black (as well as pellucid) dots; sep. ovate, acute (very small), ⅓ as long as the petals. ♃ Can. to Pa. and Ark. 2f. Lvs. 1—2′. Flowers 9″.

10 **H. maculatum** Walt. Stem terete, corymbously branched; lvs. oblong, thickly sprinkled with black dots; sep. lanceolate. ♃ S. Car. to Fla. 2—4f. Lvs. 1′. Fls. 10″.

11 **H. aùreum** Bartram. Branches spreading, ancipital; lvs. thick, lance-ovate, obtuse, sessile; flowers (large) solitary, sessile. Ga. to Ark. 2—4f. Stamens 500! †

12 **H. ambíguum** Ell. Branches ancipital; lvs. lance-linear, thin, acute; fls. solitary and in 3's in the axils of the upper leaves. Ga. 1—2f. Flowers 8″.

13 **H. myrtifòlium** L. St. terete; lvs. thick, ovate, or oblong, cordate-clasping; fls. in a leafy compound fastigiate cyme, the dichotomal sessile. Ga. Fla. 1—2f.

14 **H. cistifòlium** Lam. St. 2-winged, subsimple; lvs. linear-oblong, obtuse, sessile; flowers in a leafless, compound cyme. Ga. to Fla. and La. (No. 6, β. ?)

15 **H. nudiflòrum** Mx. St. and branches 4-angled and winged; lvs. ovate-lanceolate or oblong, obtuse, sessile; cyme leafless, peduncled; sep. linear; capsule almost 3-celled. ♃ Wet. Penn. to La. and Ga. 1—2f. Leaves 2′, thin.

16 **H. sphærocárpon** Mx. St. obscurely 4-sided; lvs. linear-oblong, obtuse, with a minute callous tip; sep. ovate, mucronate; caps. globular. ♃ Rivers, W. 1f. Fls. 7″.

17 **H. adpréssum** Bart. St. 2-winged above; lvs. linear-oblong, half erect; cymes few-leaved; petals obovate. ♃ R. I. to Ark.

18 **H. dolabrifórme** Vent. St. scarcely 2-edged above; lvs. linear-lanceolate, spreading; fls. in a leafy, fastigiate cyme; pet. very oblique (dolabriform). ♃ Ky.Tenn.

19 **H. angulósum** Mx. Herb smooth; st. acutely 4-cornered; lvs. oblong-lanceolate, acute; cymes leafless; style distinct, thrice longer than the ov. ♃ N. J. to Fla.

20 **H. ellípticum** Hook. Herb smooth; st. quadrangular, simple; lvs. elliptical, obtuse, somewhat clasping, pellucid-punctate; cyme pedunculate; sep. unequal; style united to near the summit, as long as the ovary. ♃ Can. to Pa. 1f. Flowers 6″.

21 **H. gravèolens** Buckley. Stem terete, smooth; leaves oblong-ovate, clasping; sepals and petals narrow; styles 3. ♃ High Mts., N. Car. Strong-scented.

22 **H. pilòsum** Walt. Rough-downy; stem simple, terete, virgate; lvs. ovate-lanceolate, appressed, clasping, acute; styles distinct. ① Pine-barrens, South. 1—2f.

23 **H. mùtilum** L. Stem square, branched; lvs. ovate, 5-veined, clasping, obtuse; cymes leafy; pet. shorter (1″) than sep.; sta. 6—12. ① Damp sandy soils. 3—9′. Com.
β. ***gymnánthum.*** Strict, simple or branched, cy. only bracted. Del., Penn. (Porter).

24 **H. Canadénse** L. Stem quadrangular, branched; lvs. linear, attenuated to the base, with pellucid and also with black dots, rather obtuse; petals shorter than the lanceolate, acute sepals; stamens 5—10. ① Wet sandy soils. Capsule red. 6—12′.

25 **H. Saròthra** Mx. Stem and branches filiform, erect, and parallel; lvs. very minute, subulate; flowers sessile; stam. 5—10. ① Sandy soils. 4—12′. Fls. minute.

26 **H. Drummóndii** T. & G. Branches alternate; lvs. linear, very narrow; flowers pedicellate; stamens 10—20. ① Dry. Ill. and South. 1f. Leaves 6″.

3. **ELODÈA,** Adams. ('Ελώδης, marshy; from the habit.) Sep. 5, equal. Pet. 5, equilateral, imbricated in bud. Stam. 9 (rarely more), triadelphous, the sets alternating with 3 orange-colored glands. Styles 3, distinct. Capsule 3-celled. ♃ Herbs with pellucid-punctate leaves, the axils leafless. Flowers dull orange-purple. July—Sept.

1 **E. Virgínica** Nutt. Stem erect, somewhat compressed, subsimple; leaves oblong, amplexicaul: stamens united below the middle, with 3 in each set. Swamps. 1f.

2 **E. petiolàta** Ph. Leaves oblong, narrowed at base into a petiole; flowers mostly in 3's, axillary, nearly sessile; filaments united above the middle; caps. oblong, much longer than the sepals. Swamps, S. States, N. to N. J. Flowers smaller (4″).

ORDER XVII. DROSERACEÆ. SUNDEWS.

Herbs growing in bogs, often covered with glandular hairs, with *leaves* alternate or all radical, mostly circinate (rolled from top to base) in vernation. *Flowers* regular, hypogynous, 5-merous, the *Sepals*, *Petals*, and *Stamens* persistent (withering). *Ovaries* compound, 1-celled, with the *Styles* and *Stigmas* variously parted, cleft, or united. *Seeds* ∞ in the capsule, albuminous. *Embryo* minute.

* Stamens 5. Styles distinct. Seeds on the valves of the capsule.................... DROSERA. 1
* Stamens 10—15. Styles united. Seeds all at the base of the cell...................DIONÆA. 2

1. DRŎSERA, L. SUNDEW. (*Δρόσος,* dew; from the dew-like secretion.) Sep. 5, united at base, persistent. Pet. 5. Stam. 5. Sty. 3—5, each 2-parted, the halves entire or many-cleft. Caps. 3-5-valved, 1-celled, many-seeded. ② or ♃ Small marsh herbs. Lvs. covered with reddish, glandular hairs, secreting a viscid fluid. Flowers in a raceme on a slender scape which is at first coiled, uncoiling as the flowers open.

* Scapes 4—6 times as long as the spreading leaves........................Nos. 1-3

* Scapes 1—2 times as long as the ascending leaves ....Nos. 4-6

1 **D. rotundifòlia** L. Lvs. orbicular, abruptly contracted into the hairy petiole; fls. white. ② A curious little plant, in bogs and muddy shores. Scapes 6—9′, 6-9-flowered. Leaves 1—2′, glistening as with dew-drops. June—Aug.

2 **D. capillàris** Poir. Lvs. obovate, cuneiform at base, the petioles naked; flowers purple; scape erect. ② Marshes, S. Car. to Fla. Scapes 3—12′, 6-12-flowered. May.

3 **D. brevifòlia** Ph. Lvs. cuneiform-spatulate, forming a small, dense tuft (1′ diam.); petioles very short, hairy; flowers few, rose-colored. ② N. Car. to Fla. 2—5′.

4 **D. longifòlia** L. Lvs. spatulate-oblong or obovate, ascending, alternate, tapering at base into a long, smooth petiole; scape declined at base; pet. wh. ♃ 4-7′. Lvs. 2-3′.

5 **D. lineàris** Goldie. Lvs. linear, obtuse; petioles elongated, naked, erect; scapes few-flowered, about the length of the leaves (3′); calyx glabrous, much shorter than the oval capsule; seeds oval, smooth. ♃ Borders of lakes, North. White.

6 **D. filifórmis** Raf. Lvs. filiform, very long, erect; scape nearly simple, longer than the leaves, many-flowered; petals obovate, erosely denticulate, longer than the glandular calyx; style 2-parted to the base. ♃ Wet sand. 1f. Purple.

2. DIONÆ̀A, L. VENUS' FLY-TRAP. (One of the names of Venus.) Stam. 10—15. Sty. united into 1, the stigmas many-cleft. Caps. breaking irregularly in opening, 1-celled. Seeds many, in the bottom of the cell. ♃ Glabrous herbs. Lvs. all radical, sensitive, closing convulsively when touched. Scape umbelled.

D. muscípula Ell.—A very curious plant. Sandy bogs in Car. Lvs. rosulate, lamina roundish, spinulose on the margins and upper surface, instantly closing upon insects and other objects which light upon it. Scape 6—12′, with an umbel of 8—10 white flowers. April, May. †

ORDER XVIII. ELATINACEÆ. WATER PEPPERS.

Herbs small, annual, with opposite leaves and membranous stipules. *Flowers* minute, axillary. *Sepals* 2—5, distinct or slightly coherent at base, persistent. *Petals* hypogynous, as many as the sepals. *Stamens* twice as many as the petals, *anthers* introrse. *Ovaries* 2-6-celled. *Stigmas* 2—6, capitate; *placenta* in the axis. *Fruit* capsular. *Seeds* numerous, exalbuminous.

ELÀTINE, L. MUD PURSLANE. Fls. 2-, 3-, or 4-parted, symmetrical, all the parts distinct except the united ovaries. Stig. sessile. ♒ Very small plants growing in mud, with minute, axillary, sessile flowers.

1 **E. Americàna** Arn. Stems creeping, diffuse, in patches; branches ascending 1—2′; leaves wedge-obovate, 2″, obtuse; flowers 2-parted, rarely 3-parted; seeds 6—8.

2 **E. Clintoniàna** (Peck). Stems erect, 4″, in very dense tufts, from matted roots; lvs. spatulate, ¼″; fls. 2-parted; seeds slightly curved. Sand Lake, N. Y. (C. H. Peck).

ORDER XIX. CARYOPHYLLACEÆ. PINKWORTS.

Herbs with swollen joints, opposite, entire leaves, and regular ✓ (rarely ✓) flowers. *Sepals* persistent. *Petals* often unguiculate, or bifid, or 0. *Stamens* distinct, twice as many as the sepals, or fewer. *Torus* often some developed, separating the whorls. *Styles* 2—5, *ovary* 1. *Fruit* a 1–5-celled, 1–∞-seeded pod, opening by teeth or valves. *Embryo* curved around the albumen. Figs. 6, 41, 44, 45, 56, 131, 276, 330, 456.

§ Stipules present, dry (0 in No. 17). Calyx open. Petals sessile, minute, or 0. Tribe III...(*h*)
§ Stipules 0.—*a* Calyx a tube including the long claws of the petals. Pod ∞-seeded. Tribe I...(*c*)
—*a* Calyx open. Petals sessile (rarely 0 in No. 10). Pod 3–∞-seeded. Tribe II...(*e*)
—*a* Calyx open, *white*. Petals 0. Styles 3. Pod 3-celled. Tribe IV...Mollugo. 18
I. SILENEÆ.—*c* Calyx with scale-like bractlets at base. Styles 2..................Dianthus. 1
—*c* Calyx bractless.—*d* Styles 2......................Saponaria, 2, *or* Gypsophila, 2½
—*d* Styles 3. Pod 6-toothed when open...........Silene. 3
—*d* Styles 5. Pod 10-toothed or 5-valved.........Lychnis. 4
II. ALSINEÆ.—*e* Petals erose-denticulate at the end. Styles 3....................Holosteum. 5
—*e* Petals 2-parted (sometimes wanting in No. 7)...(*f*)
f Styles 5. Capsule opening at the top by 10 teeth...............Cerastium. 6
f Styles 3. Capsule opening to the base by half-valves...........Stellaria. 7
—*e* Petals entire (often wanting in No. 9)...(*g*)
g Styles 3, or if 5, opposite to the sepals. (No. 6 or)..........Arenaria. 8
g Styles 4, opposite to the 4 sepals. Stamens 4...............Mœnchia. 9
g Styles 4 or 5, and alternate with the sepals.................Sagina. 10
III. ILLECEBREÆ.—*h* Styles or stigmas 3—5. Pod several-seeded. Pet. colored...(*k*)
k Leaves opposite.—*l* Flowers axillary, solitary...........Spergularia. 11
—*l* Flowers in terminal clusters........Stipulicida. 12
k Leaves whorled.—*m* Styles 5, pod 5-valved..............Spergula. 13
—*m* Styles 3, pod 3-valved............. Polycarpon. 14
—*h* Styles or stigmas 2 or 1. Utricle 1-seeded...(*n*)
n Sepals distinct or nearly so, greenish..................Paronychia. 15
n Sepals united into a tube below, white above...........Syphonychia. 16
n Sepals united into an urn below, green above...........Scleranthus. 17

1. DIÁNTHUS, L. PINK. Calyx tube cylindrical, striated, with 2 or more pairs of imbricated scales or bracteoles at base. Pet. 5, with long claws, limb irregularly notched. Stam. 10, styles 2, recurved. Capsule cylindrical, 1-celled, 4-valved at top. Beautiful Oriental plants, everywhere cultivated. Figs. 6, 131, 276.

§ Bracts long-pointed, equalling the calyx tube (dry, obtuse, No. 2).........Nos. 1—4
§ Bracts much shorter than the calyx tube...................................Nos. 5—7

1 **D. Armèria** L. *Wild Pink.* Leaves linear-subulate, hairy; flowers aggregated, fascicled; bracteoles erect, lance-subulate. ① Sandy fields, E. 1—2f. Flowers small (6″ broad), pink-red sprinkled with white. August. § Europe.

2 **D. pròlifer** L. Slender, strict, smooth; lvs. linear, erect, 1—2′; bracts dry, ovate, covering the calyx and pod; pet. small, pink; fl. mostly but 1. Penn. (Porter). § Eur.

3 **D.** Barbàtus. *Sweet-William,* or *Bunch P.* Leaves lanceolate; flowers in dense cymes; bracteoles erect, ovate-subulate. ♃ Europe. 1½f. Red-white. May—July.

4 **D.** Chinénsis. Leaves lance-linear; flowers solitary; bracteoles spreading, linear. ② China. 1f. Evergreen, not glaucous. Flowers large, variegated.

5 **D.** Caryophýllus. *Carnation P.* Glaucous; leaves linear; flowers solitary; bractlets very short, ovate; petals very broad, crenate. ♃ England. 2—3f. Fragrant.

6 **D.** Plumàrius. *Pheasant's Eye.* Glaucous; flowers solitary; bracts ovate, acute; petals many-cleft, hairy at throat. ♃ Europe. White-purple. June—August.

7 **D.** Supérbus. Leaves linear-subulate, green; cymes fastigiate; bracts ovate, mucronate; petals pinnatifid-fringed. ♃ Europe. White-roseate. July, August.

2. SAPONÀRIA, L. SOAPWORT. Calyx tubular, 5-toothed, without bractlets. Petals 5, unguiculate. Stamens 10. Styles 2. Capsules oblong, 1-celled. Flowers in cymous panicles. July, August. Fig. 45.

§ Calyx tube oblong, neither angled nor veined. (SAPONARIA.)..................No. 1
§ Calyx tube ovoid, 5-angled, at length 5-winged, very smooth. (VACCÀRIA.)...No. 2

1 **S. officinàlis** L. *Bouncing Bet.* Lvs. lanceolate; pet. crowned. ♃ 2f. White. §

2 **S. Vaccària** L. Lvs. lance-ovate; fls. cymous, pale red. ① 1f. Waste grounds. §

2½. GYPSOPHILA, L. GYPSUM PINK. Sepals half united into a bell-form calyx. Pet. scarcely clawed. *Caps.* globular, 1-celled, 4-valved. —Neat, free-flowering exotics. Flowers panicled. June—Sept. Europe.

1 **G.** ELEGANS. Lvs. lance., thick; pan. loose, forked; pet. notched, wh. or pink. 1f. ①

2 **G.** MURÀLIS. Low, diffuse, with linear lvs. and a profusion of pinkish small fls. ① 6′.

3 **G.** PANICULÀTA. Tall; lvs. lance-lin.; fls. minute, numerous, white, in filiform pan. ♃

4 **G.** STÈVENI. Lvs. lance-lin., keeled; fls. white, in corymbs, fine for bouquets. ♃ 2f.

3. SILÈNE, L. CAMPION. CATCH-FLY. (*Silenus* was a drunken god of the Greeks, covered with slaver as these plants are with a viscid secretion.) Calyx tubular, swelling, without scales at the base, 5-toothed; pet. 5, unguiculate, often crowned with scales at the mouth, 2 or many-cleft, or entire; sta. 10; styles 3; capsule 3-celled, opening at top by 6 teeth, many-seeded. Figs. 41, 56, 330.

§ Acaulescent, low, tufted. Petals crowned. Perennial.........................No. 1
§ Caulescent.—Petals fringe-cleft, white or rose-color, crownless. Perennial.Nos. 2—4
—Petals bifid or entire.—Calyx inflated, veiny. Perennial.......Nos. 5, 6
—Calyx close on the pod. (*)
* Flowers spicate, alternate. Upper leaves linear, lower spat. Annual...Nos. 7, 8
* Fls. not spicate.—Petals pale, closed in sunshine. Upper lvs. linear...Nos. 9, 10
—Petals red, purple, &c.,—bifid......................Nos. 11, 12
—entire......................Nos. 13—15

1 **S. acaùlis** L. *Moss Campion.* Low, moss-like; lvs. linear (6″); ped. solitary, short, 1-fld.; calyx bell-shaped; pet. obcordate, crowned. ♃ White Mts. 1—3′. Purp. Jl.

2 **S. stellàta** Ait. Erect, pubescent; lvs. in whorls of 4's, oval-lanceolate, acuminate; cal. loose and inflated; pet. fimbriate. ♃ Can. to Car. and W. 2—3f. White. July.

3 **S. ovàta** Ph. Erect, puberulent; lvs. opposite, lance-ovate, acuminate; cal. ovate, not inflated; pet. many-cleft, crownless. ♃ Car. Ga. 3f. White. July.

4 **S. Baldwìnii** Nutt. Weak, hairy; lvs. obovate-spatulate; calyx not inflated; pet. cuneiform, divaricately fimbriate. ♃ Ga. Fla. 1f. Fls. 2′, roseate. April.

5 **S. nìvea** DC. Minutely puberulent, erect, subsimple; lvs. oblong-lanceolate, acuminate; fls. few, solitary, leafy; cal. inflated; pet. 2-cleft, with a small bifid crown; caps. shorter than its stipe. ♃ Penn. to Ill. Rare. 2f. Fls. few, white. July.

6 **S. inflàta** Smith. *Bladder Campion.* Glabrous and glaucous; lvs. ovate-lanceolate; fls. in cymous, leafless panicles, drooping; cal. ovoid-globular, much inflated; caps. on a short stype. ♃ Fields. 2f. White. July. §

7 **S. quinquevúlnera** L. Villous; spike somewhat one-sided; cal. very villous; pet. roundish, entire, crowned. ① S. Car. 1f. Pet. crimson, with a pale border. §

8 **S. noctúrna** L. Lvs. pubescent; fls. small, appressed to the stem in a dense 1-sided spike; cal. cylindrical, smoothish; pet. narrow, 2-parted. ① Ct. to Pa. Rare. 2f. Jl. §

9 **S. Antirrhìna** L. *Snap-dragon Catch-fly.* Sticky in spots; lvs. lanceolate, acute; fls. few, on slender branches; cal. ovoid; pet. emarginate. ① Waste pl. 1½f. Fls. r.
  β. linària. Very slender; lvs. all linear; cal. globular. Ga. and Fla.

10 **S. noctiflòra** L. Viscid-pubescent; lower lvs. spatulate; cal. cylindrical, teeth subulate, very long; petals 2-parted. ① Cult. grounds. Flowers large, white. §

11 **S. Virgínica** L. Slender, erect, branching; root-lvs. spatulate, cauline oblong-lanceolate; flowers large, cymous, cal. large, clavate; pet. bifid, broad, crowned. ♃ Woods, Pa. to Ill. and S. 1—2f. Red. June.

12 **S. rotundifòlia** Nutt. Decumbent, branching; lvs. thin, roundish-oval; fls. solitary, very large; calyx cylindric-campanulate; petals bifid and toothed, deep scarlet, crowned. ♃ Rocks, W. States. Rare. June—August.

13 **S. règia** Sims. *Splendid Catch-fly.* Scabrous, somewhat viscid; st. rigid, erect; lvs. ovate-lanceolate; cyme paniculate; pet. oblanceolate, entire, erose at the end; sta. and stig. exserted. ♃ O. to Ill. and S. 3—4f. Bright scarlet. June, July.

14 **S. Pennsylvánica** Mx. *Wild Pink.* St. clustered, low, ascending; lvs. spatulate or cuneate, of the stem lanceolate; cyme few-flowered; pet. slightly emarginate, subcrenate. ♃ Dry soils, N. Eng., S. and W. 6—10′. Fls. pink-red. June.

15 **S. Armèria** L. *Garden Catch-fly.* Very smooth, glaucous; st. branching, glutinous below each node; lvs. ovate-lanceolate; flowers in flat cymes; pet. obcordate, crowned; cal. clavate, 10-striate. ① 12—18′. July, September. † §

4. **LYCHNIS,** L. (*Λύχνος*, a lamp; from fancied resemblance or use.) Cal. tube bractless, 10-veined, limb 5-lobed. Pet. 5, entire or cleft, often crowned. Stam. 10. Styles 5. Caps. more or less 5-celled at base, opening by 5 or 10 teeth. Handsome exotics, cultivated or §.

§ AGROSTÉMMA. Calyx limb of 5 leafy, deciduous lobes exceeding the petals.......No. 1
§ LYCHNIS *proper*. Calyx limb of 5 persistent lobes shorter than the petals...(*a*)
a Fls. diœcious. Petals 2-lobed, white or purplish. Escaped from culture......No. 2
a Fls. all perfect.—*b* Petals 2-lobed or entire..............................Nos. 3, 4
—*b* Petals 4-parted or laciniate..............................Nos. 5, 6

1 **L. Gíthago** Lam. *Corn Cockle.* St. forked; lvs. linear, hairy; fls. few, large, dull purple; seeds large, blackish. ① Fields. 2—3f. A handsome weed. July. §

2 **L. diúrna** L. Stem forked and panicled; fls. ♂ ♀; pet. half-2-cleft; pod ovoid or subglobous. ② Rare in cultivated grounds. 2f. June—August. § Eur.

3 **L.** CORONÀRIA DC. *Mullein Pink. Rose Campion.* Villous; stem dichotomous; ped. long, 1-flowered; petals broad, entire. ♃ Italy. 2f. Purple, &c.

4 **L.** CHALCEDÓNICA L. *Scarlet Lychnis* or *Sweet William.* Smoothish; fls. fasciculate; calyx cylindric-clavate, ribbed; petals 2-lobed. ♃ Russia. 2f. Scarlet.

5 **L.** FLOSCÙCULI L. *Ragged Robin.* Fls. fascicled; cal. campanulate, 10-ribbed; pet. in 4 deep, linear segments. ♃ Europe. 1—2f. Flowers pink.

6 **L.** CORONÀTA L. *Chinese Lychnis.* Fls. terminal and axillary, 1—3; calyx rounded, clavate, ribbed; petals laciniate. ♃ 1—2f. Flowers large, red, &c.

5. **HOLÓSTEUM,** L. (*Ὅλος*, all, *ὀστέον*, bone; by antiphrasis, as the plant is *no bone,* but soft.) Sep. 5. Pet. 5, erose-denticulate at the end. Stam. 3—5, rarely 10. Styles 3. Caps. 1-celled, ∞-seeded, opening by 6 teeth. Fls. white, in an umbel.

H. umbellàtum L. Lvs. smooth and glaucous, oblong, sessile; ped. long, terminal, viscid, pedicels reflexed after flowering. ① Fields: rare. 6′. § Eur.

6. **CERÁSTIUM,** L. MOUSE-EAR CHICKWEED. (*Κέρας*, a horn; from the resemblance of the capsule.) Sep. 5, ovate, acute. Pet. 5, 2-cleft or lobed. Stam. 10, rarely fewer. Styles 5, opposite to the sepals. Capsule cylindrical or ovoid, elongated, opening at top by 10 teeth, ∞-seeded. Flowers cymous, white. Fig. 44.

§ Petals about as long as the sepals..............................Nos. 1, 2
§ Petals much longer than the sepals..............................Nos. 3, 4, 5

1 **C. vulgàtum** L. Hairy, cæspitous; lvs. obovate or ovate, obtuse, attenuated at base; fls. in subcapitate clusters; sep. acute, longer than the pedicels; stam. often 5. ① Fields and waste grounds. 6—12′. June—Aug. §

2 **C. viscòsum** L. Hairy, viscid, spreading; lvs. oblong-lanceolate, rather acute; fls. in loose cymes; sep. obtuse, scarious on the margin and apex, shorter than the pedicels. ♃ Fields and waste grounds. 5—9′. Plant greener. June—Aug.

3 **C. arvénse** L. Pubescent; lvs. linear-lanceolate, acute; cyme on a long, terminal peduncle, 4-flowered; petals more than twice longer than the calyx; capsule scarcely exceeding the sepals. ♃ Rocky hills. 4—10′. May—Aug.

4 **C. oblongifòlium** Torr. Villous, viscid above; lvs. oblong-lanceolate; flowers numerous, in a spreading cyme; pet. twice as long as the sepals; capsule about twice as long as the calyx. ♃ Rocky places. Rare. 6—10′. Fls. large. April—June.

5 **C. nùtans** Raf. Viscid-pubescent, erect; lvs. lanceolate; fls. many, diffusely cymous, on long, filiform, nodding pedicels; pet. nearly twice as long as the calyx; capsule a little curved, nearly thrice as long. ① Low grounds. 8—12′. May.

7. STELLÀRIA, L. STAR CHICKWEED. (Lat. *stella*, a star; from the stellate or star-like flowers.) Sep. 5, connected at base. Pet. 5, 2-parted, rarely 0. Stam. 10, rarely fewer. Styles 3, sometimes 4. Caps. ovoid, 1-celled, valves as many as styles, 2-parted at top. Sds. many. Small herbs in moist, shady places. Fls. in forked cymes or axillary, small, wh. Fig. 456.

§ Stems hairy mostly in lines, leafy to the top. Leaves broad..............Nos. 1, 2, 3
§ Stems all glabrous,—*a* leafy to the top. Petals sometimes wanting......Nos. 4, 5, 6
—*a* leafless above, with scarious bracts...............Nos. 7, 8, 9

1 **S. mèdia** Smith. Lvs. ovate; st. procumbent, with an alternate, lateral, hairy line; pet. shorter than the sep.; stam. 3 to 5 or 10. ① A common weed. April—Nov.

2 **S. prostràta** Baldw. Lvs. ovate, the lower on long petioles; sts. procumbent, pubescent; fls. on long pedicels; pet. longer than sepals; stam. 7. ① Ga. Fla. Mar. Ap.

3 **S. pùbera** Michx. Stem ascending, pubescent in 1 lateral or 2 opposite lines; lvs. oblong, acute, sessile; pet. longer than the white-edged sep. ♃ Pa. S. and W. Apr. Jn.

4 **S. uniflòra** Walt. Smooth, erect from a prostrate base: lvs. linear-subùlate, remote; ped. long, 1-flwd.; pet. obcordate, twice longer than cal. ② Swamps, S. 10—12′. May.

5 **S. boreàlis** Bw. Smooth, weak; lvs. veinless, lance-oblong; ped. at length axillary, 1-flwd.; pet. 2-parted (often 0), as long as calyx. ♃ Wet shades, N. Eng. to Wis. 6—15′.

6 **S. crassifòlia** Ehrh. Sts. weak; lvs. linear-oblong, thickish; pet. longer than the cal., or 0; sds. roughened. Wet rocky places, Ky. and N. (Sagina fontinalis Sh.& Pet.)

7 **S. uliginòsa** Murr. Decumbent; lvs. lance-oval and oblong, veiny; cymes lateral, sessile, leafless; sep. 3-veined, as long as the bifid pet. ♃ Springs, Md. to N. H., and W.

8 **S. lóngipes** Goldie. Smooth and shining; lvs. linear-lanceolate, broadest at base; ped. erect, filiform, cymous; sep. with membranous margins, shorter than the petals. ♃ Me. to Mich. and N. June.

9 **S. longifòlia** Muhl. Lvs. linear; cyme terminal, naked, at length lateral, the pedicels spreading; petals longer than the calyx. ♃ Common. July.

8. ARENÀRIA, L. SANDWORT. (Lat. *arena*, sand, in which most species grow.) Sep. 5, spreading. Pet. 5, entire, or notched, rarely 0. Stam. 10, rarely fewer. Styles 3, rarely more or fewer, opposite to as many sepals. Capsule 1-celled, ∞-seeded, opening by valves or half-valves. Slender herbs, mostly tufted, with white flowers. (The following sections have sometimes been regarded as genera.)

§ ARENÀRIA. Caps. splitting into 6 half-valves. Lvs. acute. Seeds naked.....Nos. 1, 2
§ MŒRÍNGIA. Caps. as above. Lvs. and sep. obtuse. Sds. strophiolate..........No. 3

§ HONKÉNYA. Caps. splitting into 3 (–5) valves. Disk large, 10-lobed............No. 11
§ ALSÌNE. Capsule splitting into 3 entire valves. Disk inconspicuous..(*a*)
a Sepals 3 or 5-veined, acute, or acuminate............................Nos. 4, 5, 6
a Sepals veinless, obtuse.—*b* Leaves rigid, subulate, imbricated.............No. 7
—*b* Leaves soft, opposite, spreading........Nos. 8, 9, 10

1 **A. serpyllifòlia** L. St. dichotomous, spreading; lvs. ovate, acute, subciliate; pet. shorter than the acute sep.; pod ovate. ① Sandy pl. 2—5′. Lvs. 2—3″. Jn.–Aug. §

2 **A. diffùsa** Ell. St. long, diffuse; lvs. lance-ovate, acute at both ends; ped. 1-flwd.; pet. oval, much shorter than the calyx, or 0. ♃ Moist woods, S. 2—5f. Apr. June.

3 **A. lateriflòra** L. Upright, slightly pubescent; lvs. oval, obtuse; ped. lateral, 2 to 3-flwd.; seeds (strophiolate) appendaged at the hilum. ♃ Damp shades, N. 6—10′. Jn.

4 **A. pátula** Mx. Sts. divaricately branched, very slender; lvs. linear-filiform, obtuse; petals emarginate. ① Cliffs, Va. and Ky. 6—10′. June—July.

5 **A. Pítcheri** T. & G. Erect, fastigiately branched, almost glabrous; lvs. linear, obtuse, flat; pet. entire, twice as long as the 5-veined sepals. ① Tenn. and W. 3—6′.

6 **A. stricta** Mx. Glabrous, diffuse; st. branched from the base; lvs. subulate-linear, rigid, so fascicled in the axils as to appear whorled; cymes few-flowered, with spreading branches. ♃ Sterile grounds. 8—10′. May, June.

7 **A. squarròsa** Mx. Cæspitous; stem few-flowered; lower leaves squarrous-imbricate, crowded, upper ones few, all subulate, channelled, smooth; petals obovate, 3 times longer than the sepals. ♃ Barrens, L. I. to Ga. 6—10′. April–Aug.

8 **A. Greenlándica** Spr. Cæspitous; sts. numerous, filiform; lvs. linear, flat, spreading; ped. 1-flwd., elongated, divaricate. ♃ High Mts. N. 3′. Fls. 8″, numerous. Jl. Aug.

9 **A. brevifòlia** N. Erect (not tufted), few-leaved; stems many, filiform; lvs. minute, few, remote, ovate-subulate; sepals oblong. ① Rocks, Ga. 2—4′. May.

10 **A. glàbra** Mx. Cæspitous, glabrous; sts. filiform; lvs. linear setaceous, spreading; sep. oval, veinless, half as long as the petals. ♃ Mts. S. 4—6′. Fls. 6″. July.

11 **A. peploìdes** L. Sts. creeping, with upright branches, tufted; lvs. ovate, fleshy, half-clasping; fls. small, the veinless sepals exceeding the petals. ♃ Coast. 1f. May.

9. MŒ́NCHIA, Ehrh. (Dedicated to *Mœnch*, a German botanist.) Sep. 4, as long as the 4 entire petals and opposite to the 4 styles. Stam. 4. Caps. ovoid, not exceeding the calyx, opening by 8 teeth, ∞-seeded. ① Low, smooth, glaucous. Flowers white.

M. quaternélla Ehrh.—Dry places, Md. Stems simple, 2—3′, with 1 or 2 flowers. Leaves lance-linear, acute. Apr. May. § Eur. (Sagina erecta L.)

10. SAGÍNA, L. PEARLWORT. (Lat. *sagina*, food or nourishment; badly applied to these minute plants.) Sep. 4 or 5. Pet. 4 or 5, entire, often 0. Stam. as many or twice as many as the sepals. Styles 4 or 5, *alternate* with the sepals, but the valves of the pod are opposite. Diminutive herbs with linear leaves and small white flowers.

* Petals 0, or 4, and much shorter than the 4 sepals. Stam. 4................Nos. 1, 2
* Petals 5, equalling or much exceeding the 5 sepals. Stam. 10..............Nos. 3, 4

1 **S. procúmbens** L. Procumbent, glabrous; pet. about half as long as the roundish, obtuse sepals, sometimes 0; lvs. linear-filiform. ♃ Damp, N. 3—4′. June.

2 **S. apétala** L. Erect, puberulent; pet. very minute, or none; sep. oblong, acute; lvs. linear-subulate. ① Sandy, N. Y., N. J. and W. Stems filiform, 2—4′. May, Jn.

3 **S. subulàta** Wimmer. Smooth or puberulent, tufted; lvs. filiform-linear, mucronate, shorter than the erect ped.; pet. 5, as long as the ovate, obtuse sep., rarely 0. ② Sandy, S. 2—6′. Lvs. 6″. March, April. (S. Elliottii Fenzl.)

4 **S. nodòsa** Fenzl. Tufted, ascending, glabrous; lvs. subulate, the upper very short and fascicled; pet. much longer than the sepals. ♃ Sandy shores, N.

11. SPERGULÀRIA, Pers. SAND SPURRY. (Name derived from *Spergula.*) Sep. 5. Pet. 5, entire. Stam. 2—10. Styles 3. Caps. 3-valved, ∞-seeded.—Herbs low, spreading, with narrow opposite leaves and scarious stipules. Flowers red or rose-colored.

1 **S. rubra** Presl. Decumbent, divaricately branched, slender; stip. triangular-acuminate; lvs. linear; sep. lanceolate, with scarious margins; pet. as long, pink-red; seeds rough, marginless. ♃ Sandy, near the coast. 3—6′. May—October.

2 **S. marìna.** Plant thick and fleshy; caps. a third longer than the calyx, with the seeds nearly smooth and mostly margined. Otherwise like No. 1, and perhaps not distinct. ♃ Salt marshes. May—October. (Arenaria, L.)

12. STIPULÍCIDA, Michx. (Lat. *stipula, cædo;* the stipules being much cleft.) Sep. with scarious margins. Pet. 5, as long as the sepals, entire. Stig. 3, subsessile. Caps. subglobous, 3-valved, few-seeded. ① A slender, tufted, dichotomously branched herb, almost leafless, with the small flowers in terminal cymules.

S. setàcea Mx.—Dry sand, Ga. Fla. Stems almost setaceous, 6—10′. Joints distant, with a fringe of leaves and stipules ¼″. Root leaves roundish, 1″. Fls. reddish. May.

13. SPÉRGULA, L. SPURRY. (Lat. *spergo,* to scatter; from the dispersion of the seeds.) Sep. 5. Pet. 5, entire. Stamens 5 or 10. Styles 5. Caps. ovate, 5-valved, seeds ∞. Embryo coiled into a ring. ① Herbs with fls. in loose cymes. Leaves verticillate. Stipules scarious.

S. arvénsis L. Lvs. filiform; ped. reflexed in fruit; sds. reniform, angular, rough. Cultivated grounds. 1—2f. Lvs. 1—2′, many in a whorl. May—August. §

14. POLYCÁRPON, L. ALL-SEED. (*Πολύς,* much, *καρπός,* fruit; the pods are many.) Sepals 5, carinate. Pet. 5, emarginate. Stam. 3—5. Style short, 3-cleft. Caps. 3-valved. ① Low, diffuse, with whorled lvs.

P. tetraphýllum L. Lvs. spatulate or oval, tapering to a petiole, some of them in whorls of 4; stam. 3. Around Charleston, S. Car. 3—6′. Lvs. 3—5″. Fls. minute. §

15. PARONÝCHIA, Tourn. NAILWORT. (*Παρά,* with *ὄνυξ,* the nail; *i. e.,* the *whitlow;* supposed cure for.) Sep. 5, linear-oblong, connivent, mucronate or awned near the apex. Pet. or sterile filaments very narrow and scale-like, or none. Stam. 2, 3, or 5. Stig. 2, with the styles more or less united into 1. Utricle 1-seeded. Low herbs dichotomously branched, with scarious, silvery stips., and at least the lower lvs. opposite.

§ PARONYCHIA. Sepals evidently awned at apex. Lvs. linear and subulate....Nos. 1, 2
§ ANÝCHIA (Mx. partly). Sep. merely mucronate at apex. Lvs. lanceolate to oval.(*)
  * Stems procumbent, diffuse on the ground. Stamens 5....................Nos. 3, 4
  * Stems erect, with diffusely ascending branches. Stamens 2 or 3.........Nos. 5, 6

1 **P. dichótoma** Nutt. Glabrous, densely branched; lvs. acerose, mucronate; bracts like the leaves; cymes fastigiate, with no central flower; sepals 3-veined, cuspidate. ♃ Rocks, Va. to Car. and Ark. 6—12′. Lvs. 1′. July—November.

2 **P. argyrócoma** Nutt. Pubescent, tufted, decumbent; lvs. linear, acute; cymes glomerate, terminal; fls. enveloped in dry, silvery bracts; sep. hairy, 1-veined, setaceously cuspidate. ♃ Mts. N. H. Va. to Ga. 4—10′. Lvs. 6—10″. July.

3 **P. herniarioìdes** Nutt. Scabrous, diffusely branched; lvs. oval or oblong, mucronate; the ramial alternate. Fls. sessile in the axils of the leaves; sep. 3-veined, merely mucronate. ♃ Sand, S. Small, flat. Lvs. 1—3″. July—October.

4 **P. Baldwínii** Chapm. Diffusely branched, procumbent; leaves linear-lanceolate, very acute, all opposite; flowers longer than the setaceous stipules, mostly terminal, stalked; stam. 5. ① Dry fields, Fla. Ga. 6—10′. Lvs. few. July—Oct.

5 **P. Canadénsis.** Stem erect, slender, pubescent, many times forked, with slender or capillary branches; lvs. lanceolate, the ramial alternate; style none; utricle equalling the sepals. ① Woody hills.

β. ***púmila.*** Dwarf (2—4′), tufted; fls. closely sessile; style as long as ovary, forked at apex. Dry hills, Md. (Mr. Shriver.)

16. SIPHONÝCHIA, Torr. and Gr. (*Σίφων,* a tube; that is, *Anychia* with a tubular calyx.) Sep. linear, petaloid above, coherent into a tube below, unarmed. Pet. 5 setæ alternate with the stamens on the throat of the calyx. Style filiform, minutely bifid; utricle included. ① Diffuse and widely spreading. Fls. in glomerate, terminal cymes, white. Jn.—Oct.

§ Calyx tube bristly with hooked hairs. Stems prostrate, diffuse............Nos. 1, 2
§ Calyx smooth or merely pubescent. Stems erect..........................Nos. 3, 4

1 **S. Americàna** T. & G. Sts. pubescent in lines; lvs. lanceolate; sep. rounded, incurved at apex; fls. solitary and clustered. ① S. Car. to Fla. 1—2f. Lvs. small.

2 **S. diffùsa** Chapm. Pubescent; lvs. lanceolate, obtuse; sep. linear, mucronate; fls. in dense cymes. ① Pine-barrens, Fla. 1f.

3 **S. erécta** Chapm. Sts. smooth, rigidly erect, subsimple; lvs. linear; sep. lanceolate, tube smooth, furrowed. ♃ Sands, Fla. 6—12′.

4 **S. Rugèlii** Chapm. Erect, dichotomous, pubescent; lvs. oblanceolate; sep. conspicuously mucronate, the tube hairy. ① E. Fla. 1f. (Paronychia, Shutt.)

17. SCLERÁNTHUS, L. KNAWEL. (*Σκληρός,* hard, *ἄνθος;* the calyx hardens in fruit.) Sep. 5, united below into a tube contracted at the orifice. Pet. 0. Sta. 10, rarely 5 or 2. Styles 2, distinct. Utricle very smooth, enclosed in the hardened calyx tube. ① A prostrate, diffuse little weed, exstipulate.

S. ánnuus L. Dry fields and roadsides, N. and M. 3—6′. Lvs. linear, acute, short, partially united at their bases. Fls. very small, green, in axillary fascicles. July.

18. MÓLLUGO, L. CARPET-WEED. Calyx of 5 sepals, inferior, united at base, colored inside. Cor. 0. Sta. 5, sometimes 3 or 10. Fil. setaceous, shorter than and opposite to the sepals. Anth. simple. Caps. 3-celled, 3-valved, many-seeded. Seeds reniform. Lvs. at length apparently verticillate, being clustered in the axils.

M. verticillàta L. Lvs. cuneiform, acute; st. prostrate, branched; pedicels 1-flowered, subumbellate; sta. mostly but 3. ① Dry fields. 6—10′. White.

ORDER XX. PORTULACACEÆ. PURSLANES.

Herbs succulent or fleshy, with entire leaves, no stipules, and regular flowers. *Sepals* 2, united at base. *Petals* 5, more or less imbricated. *Stamens* variable in number, but opposite the petals when as many. *Ovaries* free, 1-celled. *Styles* several, stigmatous along the inner surface. *Fruit* a pyxis, dehiscing by a lid, or a capsule, loculicidal, with as many valves as stigmas. *Seeds* with a coiled embryo.

* Stamens 8—20, perigynous. Capsule opening by a lid (a pyxis)..... ....PORTULACA. 1
* Stamens 10—30, hypogynous. Capsule opening by valves........................TALINUM. 2
* Stamens 5, each on the base of a petal. Capsule 3-valved. ....CLAYTONIA. 3
* Stamens 4—15. Capsule 3-valved. Leaves alternate............................CALANDRINIA. 4

1. PORTULÀCA, Tourn. PURSLANES. Sep. 2, the upper portion deciduous. Pet. 5 (4 to 6), equal. Stam. 8—20. Style 3-6-parted. Pyxis opening near the middle, ∞-seeded. Low, fleshy herbs.

1 **P. oleràcea** L. Stems reddish, prostrate; leaves cuneate. ① Cultivated grounds, especially gardens. 1f. Plant very smooth, succulent. Fls. small, yellow. June—Aug.
2 **P.** GRANDIFLÒRA. Upright; lvs. linear, acute; fls. large, rose-purple. ① S. Am. 8′.
3 **P.** GILLÉSII. Upright; lvs. short, terete, blunt; fls. large, deep purple. ① S. Am.

2. TALÌNUM, Adans. Sep. 2, ovate, deciduous. Pet. 5, sessile, inserted with the 10—20 stamens into the torus. Style trifid. Caps. 3-valved, ∞-seeded.—Herbs fleshy, smooth.

T. teretifòlium L. Stem short, thick, with crowded linear lvs. at the ends of the short branches, with long (6′) terminal, naked peduncles, bearing a cyme of purple, ephemeral flowers. ♃ Rocks, Penn. to Ga. June—Aug.

3. CLAYTÓNIA, L. SPRING BEAUTY. (In memory of *John Clayton*, one of the earliest botanists of Virginia.) Sep. 2, ovate or roundish. Pet. 5, emargined or obtuse. Stam. 5, inserted on the claws of the petals. Stig. 3-cleft. Caps. 3-valved, 2–5-seeded.—Small, fleshy, early flowering plants, arising from a small tuber. (Stem with 2 opposite leaves.)

1 **C. Caroliniàna** Mx. Lvs. ovate-lanceolate; sep. and pet. obtuse. ♃ Moist woods. Stem 3′, bearing 2 (rarely 3 or 4) leaves; root leaves few; fls. white, with purple lines.
2 **C. Virgínica** L. Lvs. linear or lance-linear; sepals rather acute; petals obovate, mostly emarginate or retuse; ped. slender, nodding. ♃ In low, moist grounds, more common than the first, the 2 opposite leaves 3—5′ long. Flowers roseate.

4. CALANDRÍNIA, H. B. K. (*Calandrini* was an Italian botanist.) Sep. 2. Pet. 3—5. Stam. 4—15, mostly hypogynous. Style short, stig. 3. Caps. 3-valved.—Herbs of Chili and California, smooth, with alternate leaves and purple flowers.

1 **C.** GRANDIFLÒRA. Leaves rhomboid; raceme terminal. ♃ Chili. 1f. Fls. near 2′.
2 **C.** SPECIÒSA. Leaves linear-spatulate; flowers axillary. ① Cal. 6′. Fls. 1′ broad.

ORDER XXIII. MALVACEÆ. MALLOWS.

Herbs or shrubs with alternate, stipulate leaves and regular flowers, with 5 *sepals* united at base, valvate in the bud, often subtended by an involucel; 5 *petals* hypogynous, convolute in the bud, with the *stamens* ∞ monadelphous, hypogynous, and 1-celled reniform *anthers*. *Pistils* several, distinct, or united, and *stigmas* various. *Fruit* a several-celled capsule, or a collection of 1-seeded indehiscent carpels. *Seeds* with little or no *albumen*, and a curved *embryo*.

§ Calyx naked, *i. e.*, having no involucel. (*b*)
§ Calyx involucellate.—Carpels (and styles) more than 5. (*a*)
—Carpels 3 to 5 only,—1-seeded. (*c*)
—3— ∞-seeded. (*d*)

a Involucel of 6 to 9 bractlets. Carpels 1-seeded.......... .. ..ALTHÆA. 1
a Involucel of 3 distinct bractlets. Carpels 1-seeded. Stigmas linear.......MALVA. 2
a Involucel of 3 united bractlets. Carpels 1-seeded..........................LAVATERA. 3
a Involucel of 3 distinct bractlets. Carpels 2-seeded.......................MODIOLA. 4
a Involucels (of 2 or 3 distinct bractlets). Carpels 1-seeded. Stig. capitate....MALVASTRUM. 5
b Flowers diœcious. Stigmas 10, linear...NAPÆA. 6
b Flowers perfect. Carpels 5 or more, 1-seeded........, ...SIDA. 7
b Flowers perfect. Carpels 5 or many, 3 to 9-seeded....... ....ABUTILON. 8
c Stigmas 10. Carpels 5, baccate, united...................................MALVAVISCUS. 9
c Stigmas 10. Carpels 5, dry, distinct..PAVONIA. 10
c Stigmas 5. Carpels 5, dry, united into a pod..........................KOSTELETZKYA. 11
d Involucre of many bractlets. Calyx regular.........................HIBISCUS. 12
d Involucre of 3 incisely-toothed bractlets.........................GOSSYPIUM. 13

1. ALTHÆA, L. MARSH MALLOW. ('Αλϑω, to cure; the mucilaginous root is highly esteemed in medicine.) Calyx surrounded at base by a 6–9-cleft involucel. Styles ∞, with linear stigmas. Carpels ∞, 1-seeded, indehiscent, arranged circularly, and at maturity separating from the axis.

1 **A. officinàlis** L. Lvs. soft-downy on both sides, cordate-ovate, dentate, somewhat 3-lobed; ped. much shorter than the leaves, axillary, many-flowered. ♃ Salt marshes, North. 3f. Flowers large, pale purple. Sept. § Eur.

2 **A. ròsea** Cav. *Hollyhock.* St. erect, hairy; lvs. cordate, 5–7-angled, rugous; fls. axillary, sessile. ② Gardens, often sowing itself. 6f. Flowers of all colors. §

2. MALVA, L. MALLOW. (Μαλαχή, soft; on account of the soft mucilaginous properties.) Calyx 5-cleft, the involucel 3-leaved. Pet. obcordate or truncate. Styles ∞, with linear stigmas. Carpels ∞, 1-celled, 1-seeded, indehiscent, arranged circularly, and at maturity separating from the axis.

* Leaves triangular-hastate, crenate, scabrous. Carpels acute.................No. 1
* Leaves orbicular, with 5—7 angular lobes. Carpels obtuse........... ....Nos. 2—4
* Leaves palmately 5–7-parted...Nos. 5—7

1 **M. triangulàta** Lav. Rough-hairy; lvs. triang.-hastate, crenate; the lower cordate; panicle many-flowered; carp. 10—15, slightly beaked, at length 2-valved. ♃ Dry prairies, W. and S. 2—3f. Petals 1′, purple. July, Aug. (Callirrhoë triang. Gr.)

2 **M. rotundifòlia** L. *Low Mallow.* St. prostrate; lvs. obtusely 5-lobed; cor. pale, twice as long as the calyx. ♃ Waste grounds. 1f. June, July. § Eur.

3 **M. sylvèstris** L. *High Mallow.* St. erect; lvs. 5–7-lobed, lobes rather acute; pet. purple, 3 times longer than sepals. ② Waysides. 3f. June, July. § Eur.

4 **M. críspa** L. St. erect; lvs. angular-lobed, dentate, crisped, smooth; fls. axillary, sessile, white. ① Gardens and waste grounds. 5f. June—Aug. § Syria.

5 **M. moschàta** L. *Musk Mallow.* Erect; radical lvs. reniform, incised, cauline 5-parted, the segments linear-cuneiform, incisely lobed; peduncles shorter than the leaves. ♃ Gardens and waysides. 2f. Flowers large, roseate. July. § Eur.

6 **M. A'lcea** L. Erect; rt. lvs. angular; st. lvs. 5-lobed, the lobes merely incised; stem and calyx velvety. ♃ Escaped from gardens: rare. 3f. Fls. purple. July. † § Eur.

7 **M. Papàver** Cav. *Poppy Mallow.* Lvs. 3-5-parted, segm. oblong or linear, entire or toothed; fls. on very long peduncles; bracteoles 1—3, subulate. ♃ Open woods, South. 12—18′. Flowers bright red. May, June. (Callirrhoë Papaver Gr.)

3. LAVATÈRA, L. (Named in honor of the two *Lavaters*, physicians of Zurich.) Calyx subtended by an involucel of 3 united bracteoles. Stigmas ∞, filiform. Carpels ∞, 1-celled, 1-seeded, indehiscent, arranged circularly as in Malva.

L. TRIMÉSTRIS. Annual; lvs. roundish-cordate, the upper angular; fls. large, red, solitary. Europe. 2f. The flowers vary to white. July, Aug.

4. MODÌOLA, Mœnch. (Lat. *modiolus*, a certain measure; from the fancied resemblance of the fruit to a basket.) Calyx 5-cleft, with an involucel of 3 bractlets at base. Stigmas 15—20, capitate. Carpels same number, 2-seeded, transversely 2-celled, 2-valved. ①② Prostrate, with cleft leaves and small flowers.

M. multífida Mœnch. Lvs. roundish, cordate, 3—5 cleft; segm. cut-toothed; ped. soon longer than the petioles. ♃ Car. Ga. and W. 1—2f. Fls. 6″, red. July, Aug.

5. MALVÁSTRUM, Gray. (Name altered from *Malva.*) Involucel of 1—3 leaves, or 0. Styles 5—20. Stigmas capitate. Carp. 5—∞, often beaked or awned, each 1-seeded.

1 **M. angústum** Gr. Branched, erect, hairy; lvs. lanceolate, with bristle-form stip.; invol. bristleform; carps. 5, dehiscent. ① S. Car. Ga. 1f. Fls. yellow. (Sida, Ph.)

2 **M. tricuspidàtum** Gr. Shrubby; rough-hirsute; lvs. ov.-oblong; stip. lanceolate; invol. 3-leaved; carp. 10—12, 3-awned at apex. ♃ S. Fla. 1f. Yellow.

6. NAPÆA, Clayt. (*Νάπη*, a wooded valley between mountains, where Clayton discovered the plant.) Involucel none. Calyx 5-toothed; fls. diœcious. Styles 6—8, with filiform stigmas. Carpels as many, 1-seeded, indehiscent, beakless, circularly arranged. ♃ Tall, with large, palmately divided leaves and small white flowers in leafy panicles.

N. dioìca L.—Rocky thickets, Pa. Va. to Ill. Stem weak. 4—6f. Leaf segm. 5—11, lanceolate, acuminate, coarsely toothed. Flowers 4—5″. August.

7. SIDA, L. Involucel 0. Fls. perfect. Calyx 5-cleft. Styles 5 or more, with the stigmas capitate or truncate. Carp. 5—∞, 1-seeded, finally separable. Herbs or shrubs, mostly tomentous.

* Leaves palmately parted. Flowers rose-white. Carpels beaked..........Nos. 1, 2
* Leaves undivided. Flowers red or yellow.—*a* Carpels 5 or 7..............Nos. 3, 4
—*a* Carpels 10—12..............Nos. 5—8

1 **S. Napæa** Cav. Nearly glabrous; lvs. palmately 5-lobed, lobes oblong, acuminate, coarsely-toothed; ped. many-flowered; carpels 10, acuminate-beaked. ♃ Woods, Penn. to Va. 3f. Fls. 8″. White. July.

2 **S. alcæoìdes** Mx. Strigous-pubescent; lvs. palmately 5-7-parted, the segments laciniate; fls. corymbed, terminal; carp. 10, acute. ♃ In barren oaklands, Tenn. Ky. 1—2f. Fls. nearly as large as in the Musk Mallow. (Callirrhoë alcæoides Gr.)

3 **S. spinòsa** L. St. rigid; lvs. ovate-lanceolate, serrate, with a spinous tubercle at the base of the petiole; stip. setaceous, shorter than the petioles or axillary peduncles; carp. 5, birostrate. ② Sandy, M. and W. 8—16′. Yellow. July. §

4 **S. ciliàris** Cav. St. prostrate; lvs. elliptical, obtuse; stip. setaceous, and calyx ciliate; carp. 7, tipped with 2 spines; fls. red. ♃ S. Fla.

5 **S. stipulàta**. Cav. Smoothish; leaves rhombic-lanceolate, dentate; stip. subulate, longer than the petioles, persistent; carpels 10—12, pointed with 2 short spines. ♃ Sandy soils, S. 18′. Pet. 5″, yellow. July. (S. hispida C-B.)

6 **S. Elliòttii** Torr. & Gr. Lvs. linear-oblong, obtuse at base; ped. 1-flowered, a little longer than the petioles; caps. truncate. ♃ Sandy soils, S. 3f. Yellow.

7 **S. rhombifòlia** L. Leaves rhombic-oblong, serrate, cuneate and entire at base; ped. much longer than the petioles; caps. 2-beaked. ① S. Car. to Fla. 2f. Yellow.

8. ABÙTILON, Dill. INDIAN MALLOW. Calyx 5-cleft, without an involucel, often angular. Styles 5 to 20, with capitate stigs. Carps. as many, arranged circularly, each 1-celled, 3 to 6-seeded, and opening by 2 valves.

§ HERBACEOUS. Lvs. ovate, crenate, acuminate, velvety. Fls. erect........Nos. 1, 2
§ SHRUB. Leaves 3–5-acuminate-lobed. Fls. pendulous..........................No. 3

1 A. Avicénnæ Gært. Tomentous; lvs. roundish, cordate; ped. shorter than the long petiole; carp. about 15, inflated, 2-beaked, 3-seeded. ① Waste places. 3f. Yel. Jl. §

2 A. Hulseànum Torr. Pilous-hispid; lvs. roundish; ped. 3–5-flowered; carpels about 12; fls. near 2′ broad, light purple. Fla. Lvs. small, whitish beneath.

3 A. STRIÀTUM. *Tassel-Tree.* Shrub with maple-like lvs. and tasselform fls., the column exserted. Greenhouse. 5—10f. Orange-red, scarlet-veined. Brazil.

4 A. VEXILLÀRIUM. Shrub with long, slender, drooping branches; leaves lance-ovate, cordate, crenate-serrate; flowers droop on filiform stalks, cylindric; calyx scarlet, corolla golden yellow, column exserted. Greenhouse. Flowers all Winter.

9. MALVAVÍSCUS DRUMMÓNDII. GLUE MALLOW. Shrub 4f, with showy, erect, axillary scarlet flowers. Involucel of many bractlets. Pet. erect. Styles 10, with capitate stigmas. Fruit fleshy. Leaves roundish, cordate, angularly 3-lobed, coarsely crenate-toothed. Column long-exserted. § About N. Orleans.

10. PAVÒNIA, L. (Latin *pavo*, peacock; suggested by the colors.) Involucel of 5 or more bracteoles. Calyx 5-cleft. Carpels 5, half as many as the branches of the style, 1-seeded. Stig. capitate. Fruit dry. ♄

P. Lecóntii T. & G. Shrubby; lvs. sagittate-oblong, obtuse, hoary-tomentous beneath; bractlets 5; carpels blunt, rugous. 5f. Ga. (Mr. Jones), rare. Fls. 18″ diam., rose-white, with a deep purple centre. (P. Jonesii C–B.)

11. KOSTELÈTZKYA, Presl. (In honor of *Kosteletzky*, a German botanist.) Calyx, involucel, styles, &c., as in Hibiscus. Fruit a 5-celled, depressed capsule, with a single seed in each cell.

K. Virgínica Presl. Lvs. acuminate, cordate, ovate, dentate, upper and lower ones undivided, middle 3-lobed; ped. axillary, and in terminal racemes; fls. nodding, pistils declinate. ♃ Marshes, L. I. to Ga. 3f. Fls. 2½′, rose-red. Aug.

12. HIBÍSCUS, L. Calyx 5-cleft, subtended by an involucel of many bractlets. Column long with the stamens lateral and the 5 stigmas capitate. Fruit a 5-celled capsule, loculicidal, the valves bearing the partitions in the middle. Seeds 3 or many in each cell. ♄ ♃ Flowers large and showy. Plants often cultivated.

§ HIBÍSCUS *proper*. Calyx equally 5-cleft or toothed, persistent...(*a*)
§ ABELMÓSCHUS. Calyx tube in flowering split down to the base on one side..Nos. 12, 13
  a Shrubs and trees. Leaves undivided, ovate, &c. Stip. persistent......Nos. 9—11
  a Herbs.—*b* Calyx, &c., tomentous. Lvs. undivided, angularly lobed.....Nos. 1, 2, 3
    —*b* Calyx, &c., hispid. Leaves palmately divided.....................Nos. 4, 5
    —*b* Calyx, &c., glabrous.—*c* Leaves strongly 3–5-lobed..............Nos. 6, 7
      —*c* Leaves ovate, undivided.................................No. 8

1 H. Moscheùtos L. Simple, erect, hoary-tomentous; lvs. ovate, obtusely dentate, some 3-lobed; ped. long, often cohering with the petiole; pod and seeds smooth; sepals abruptly pointed. Brackish marshes. 4—6f. Fls. 6′ diam., roseate. Aug.

β. flavéscens. Fls. larger (pet. 4′ long), of a light sulphur-yellow, with a purple centre. Marshes, Indiana to Fla. (H. incanus Wendl.)

3 H. grandiflòrus Mx. Lvs. cordate, acuminate, repand-dentate, downy both sides, hoary beneath; pods densely hirsute. S. and W. 5—7f. Pet. 4½′, flesh-color. Jl.–Oct.

4 H. aculeàtus Walt. Prickly-hispid; lvs. 3–5-lobed, repand-toothed; bractlets of the involucel linear, forked at the end; sep. red-veined. S. 3—5f. Fls. 4½′, y-p. Jn. +

5 **H. Triònum** L. *Flower-of-an-Hour.* Hispid; leaves 3-parted, middle segments long, all sinuate-lobed; bractlets entire; calyx inflated, membranous; flowers yellowish, dark-brown centre, ephemeral, numerous. Fields and gardens. § Italy.

6 **H. militàris** Cav. Glabróus; leaves hastately 3-lobed, lobes acuminate, serrate; corolla tubular-campanulate; capsules smooth, ovoid-acuminate; seeds hairy. ♃ Penn., S. and W. 4f. Petals flesh-color, purple at base, 3′. July, August.

7 **H. coccíneus** Walt. Very smooth; lvs. palmate, 5-parted, lobes lanceolate, acuminate; corolla expanding; caps. ovoid. ♃ South. 6f. Flowers 6′, scarlet. July, Aug.

8 **H. Caroliniànus** Muhl. Smooth; lvs. cordate, ovate, acuminate; ped. free from petiole; pet. downy inside, purple, 4′; pod globular. ♃ Wilmington Isl., Ga. (Elliott).

9 **H. Syrìacus** L. *Althœa. Tree Hibiscus.* Lvs. ovate, cuneiform at base, 3-lobed, dentate; ped. scarcely longer than petiole. Fls. wh.-purp. or roseate. 8—15f. § Syria.

10 **H. Floridànus** Shutt. Hispid; lvs. ovate-cordate, obtuse, small; fls. pendulous on long peduncles, scarlet or crimson; stamens exserted. S. Fla. 4—5f. Fls. 1′.

11 **H.** Rosa-Sinénsis. *Chinese H.* Shrub with very smooth ovate pointed lvs. coarsely dentate at end; fls. very large, dark red, varying to buff, yellow, striped, and double.

12 **H.** esculéntus. *Okra.* Lvs. cordate, 5-lobed, obtuse, dentate; petiole longer than the fl.; involucel about 5-leaved, caducous. ① 5f. Cult. for its large, mucilaginous pods.

13 **H.** Mánihot. Lvs. divided into 5—7 linear, pointed, few-toothed lobes; bractlets of the involucel 5—7, persistent. ♃ China. 4f. Fls. sulph.-yellow, purp. centre. Jl. +

13. **GOSSÝPIUM,** L. Cotton Plant. Calyx obtusely 5-toothed, surrounded by an involucel of 3 cordate leaves, deeply and incisely toothed. Stamens very numerous, lateral. Stigmas 3, rarely 5, clavate. Seeds ∞, involved in cotton. Flowers yellow. Fig. 201.

1 **G.** herbàceum. Leaves 3-5-lobed, with a single gland below, lobes mucronate; seeds brownish, cotton white. ① 5f. Cultivated South. Yellow.

2 **G.** Barbadénse. *Sea Island C.* Leaves with 3 glands on the mid-vein below; seeds black, cotton white, long and silky. ② Coasts, South. Planted in Autumn.

Order XXIV. STERCULIACEÆ. Silk Cottons.

Large *trees* or *shrubs* with simple or compound leaves, with flowers similar to those of the Mallow, except that the *anthers* are 2-celled and turned outward. *Fruit* capsular, of 3, rarely 5 carpels.

* Involucel 0. Petals 0. Carpels 5. Stamens 10—20, all fertile, monadelphous..Sterculia.
* Involucel 0. Petals 5, long-clawed. Carpels 5. Fertile stamens 5. S. Fla..Ayenia *pusilla.*
* Involucel 3-leaved. Petals 5. Carpel 1. Stamens 5, all fertile. S. Fla......Waltheria *Americàna.*

1. **STERCÙLIA,** L. Calyx 5-lobed, sub-coriaceous. Stam. monadelphous, united into a short, sessile cup. Anth. adnate, 10, 15, or 20. Carp. 5, distinct, follicular, 1-celled, 1 – ∞-seeded.—Trees with axillary panicles or racemes.

S. platanifòlia L. Leaves cordate at base, palmately 3-5-lobed, smooth; calyx rotate, reflexed, greenish, in clusters. Cultivated South. 30f. Japan. A handsome tree.

Order XXIV. *bis.* TAMARISCINEÆ. Tamarisks.

Shrubs or *herbs* with minute, scale-like leaves, dense slender racemes of small 4-5-parted flowers. *Stamens* definite, hypogynous. *Styles* 3. *Capsules* 3-valved, 1-celled, ∞-seeded. *Seeds* with a coma. *Albumen* 0. *Embryo* straight.

TǍMARIX GALLICA. Characters mainly as given in the Order. Pet. and sta. 5. A beautiful shrub, 10f, with virgate branches, bearing numerous exceedingly delicate racemes of flesh-colored fls. Lvs. lance-subulate, clasping. Eur. Nearly hardy

ORDER XXV. TILIACEÆ. LINDENBLOOMS.

Trees or *shrubs* (rarely *herbs*) with simple, stipulate, alternate, dentate leaves, with *flowers* axillary, hypogynous, usually perfect and polyadelphous; with the *sepals* 4 or 5, deciduous, valvate in bud, the *petals* 4 or 5, imbricated. *Stamens* ∞, with 2-celled, versatile *anthers*. *Ovary* of 2—10 united *carpels*, and a compound *style*. *Fruit* dry or succulent, many-celled, or 1-celled by abortion. *Embryo* in the axis of fleshy albumen.

1. **CÓRCHORUS,** L. Sep. and pet. 4 or 5. Stam. ∞, rarely as few as the petals. Style very short, deciduous, stig. 2 to 5. Caps. roundish or siliquose, 2–5-celled, many-seeded. ♄ Flowers yellow.

C. siliquòsus L. Lvs. ovate-lanceolate, acuminate, equally serrate, 4 times longer than the petioles; caps. siliquose, linear, 2-valved. La. to Fla. Flowers 4-merous.

2. **TÍLIA,** L. LINDEN or LIME TREE. Calyx of 5, united sepals, colored. Cor. of 5, oblong, obtuse petals, crenate at apex. Stam. ∞, somewhat polyadelphous, each set (in the N. American species) with a petaloid scale (staminodium) attached at base. Ov. superior, 5-celled, 2-ovuled. Caps. globous, by abortion 1-celled, 1–2-seeded. ♄ Lvs. cordate. Fls. cymous, cream-white, with the peduncle adnate to the vein of a large leaf-like bract.

§ Staminodia 5, petaloid, opposite the petals. Leaves mucronate-serrate....Nos. 1, 2
§ Staminodia none. Stamens scarcely cohering.......... ....No. 3

1 **T. Americàna** L. *Bass-wood.* Lvs. broad cordate, unequal at base, acuminate, coriaceous, smooth, and green on both sides; pet. truncate or obtuse at apex; sty. as long as the petals. Woods, N. and M. States. 70f. June. Timber valuable.

β. ***Wálteri.*** Lvs. pubescent (but green) beneath. A large tree. Va. to Fla.

2 **T. heterophýlla** Vent. *White Bass-wood.* Lvs. obliquely subcordate, scarcely acuminate, white and velvety beneath, shining, and dark green above; pet. obtuse, crenulate; sty. hairy at base, longer than the petals. River banks, W. 40f.

β. ***alba.*** Lvs. whitish and minutely tomentous beneath, serratures fine and long-mucronate. Ky. and South along the mountains. 80f.

3 **T.** EUROPÆA L. *Lime Tree.* Lvs. suborbicular, obliquely cordate, abruptly acuminate, serrulate, twice as long as the petioles, glabrous except a woolly tuft in the axils of the veins beneath. Parks. 40f. † Eur.

ORDER XXVI. CAMELLIACEÆ. CAMELLIAS or TEAWORTS.

Trees or *shrubs* with alternate, simple, feather-veined, exstipulate *leaves*. *Flowers* regular, polyandrous, hypogynous, cyanic, with *sepals* and *petals* imbricated, the former often unequal in size. *Stamens* more or less coherent at base into one, three, or five sets. *Anthers* 2-celled. *Seeds* few, with little or no albumen. *Cotyledons* large.

§ Calyx of many imbricated sepals. Stamens monadelphous..........................CAMELLIA. 1
§ Calyx simple.—Stamens united at the base into one set..........................STUARTIA. 2
—Stamens in 5 sets, adhering to the base of the petals...............GORDONIA. 3

1. CAMÉLLIA, L. TEA ROSE. TEA. Sepals many, imbricated, the inner ones larger. Fil. ∞, shorter than the corolla, united at base, some of the interior free. Styles united. Stigmas 3—5, acute. ♄ ♄

1 C. JAPÓNICA L. *Japan Rose.* Leaves ovate, acuminate, acutely serrate, glabrous and shining; flowers terminal, solitary; petals obovate; stamens 50 (mostly transformed to petals); stigmas 5-cleft. Tree in Japan, here a beautiful greenhouse shrub.

2 C. (Thea) BOHÈA. Shrub 4f; lvs. elliptic-oblong, acute, some rugous, twice as long as broad; flowers axillary, white. Cultivated throughout China and Japan—rarely here.

3 C. (Thea) VÍRIDIS. Shrub 4f; lvs. lance-oblong, thrice longer than broad, flat, acute; fls. white, 1′ broad. China. The leaf of these shrubs, variously *cured*, is the *Bohea*, *Black*, *Green*, or *Imperial Tea.*

2. STUARTIA, Catesby. Sepals 5 (or 6), ovate or lanceolate. Petals 5 (or 6), obovate, crenulate. Stamens monadelphous at base. Capsules 5-celled, 5- or 10-seeded, seeds ascending. ♄ Leaves large, deciduous; flowers showy, fragrant, axillary, nearly sessile.

§ STUÁRTIA *proper.* Styles united. Capsule globous. Seeds lenticular........No. 1
§ MALACHODÉNDRON. Styles distinct. Capsule ovoid. Seeds margined.......No. 2

1 S. Virgínica Cav. Leaves oval, acuminate, thin, serrulate, downy beneath; sepals roundish; pet. white; fil. purple, anth. blue. Va. to Fla. and La. 6—12f. Apr., May.

2 S. pentágyna L'Her. Leaves ovate, acuminate; sep. lanceolate: one pet. smaller than the others, all cream-white; capsules 5-angled. Ky. to Ga. 10—15f. June, Jl.

3. GORDONIA, Ellis. LOBLOLLY BAY. Sepals 5, roundish, strongly imbricated. Pet. 5. Sta. 5-adelphous, one set adhering to each petal at base. Styles united into one. Caps. woody, 5-celled. Seeds 2 or more in each cell, pendulous. ♄ With large, white, axillary, pedunculate flowers.

§ GORDONIA *proper.* Stam. inserted on a 5-lobed cup, as short as the style......No. 1
§ FRANKLÍNIA. Stam. inserted on the pet. at base, longer than the style.......No. 2

1 G. Lasiánthus L. Leaves coriaceous, perennial, glabrous, shining on both sides, lance-oblong; peduncles half as long as the lvs.; fls. 3′. S. 70f. July, August.

2 G. pubéscens L'Her. Leaves thin, serrate, deciduous, oblong-cuneiform, shining above, canescent beneath; fls. on short peduncles; sep. and pet. silky. S. 30f. May. +

ORDER XXVII. MELIACEÆ.

Trees or *shrubs* with exstipulate, often pinnate leaves. *Flowers* 4–5-merous. *Stamens* 6—10, coherent into a tube, with sessile anthers. *Disk* hypogynous, sometimes cup-like; *style* 1. *Ovary* compound, several-celled, cells 1—2—6-ovuled. *Fruit* fleshy or dry, often 1-celled by abortion. *Seeds* winged or wingless.

§ MELIEÆ. Cells of the ovary 2-ovuled. Seeds wingless, few (in a fleshy drupe)....MELIA. 1
§ SWIETENIEÆ. Cells of ovary many-ovuled. Seeds winged, many in the capsule..SWIETENIA. 2

1. MELIA, L. PRIDE OF INDIA. (*Μέλι*, honey; the name was first applied to the Manna Ash.) Sep. small, 5, united. Pet. spreading. Sta. tube 10-cleft at summit, with 10 anthers in the throat. Ovary 5-celled, 10-ovuled. Style deciduous. Drupe with a 5-celled, bony nut, cells 1-seeded. ♄ With bipinnate lvs. and panicles of delicate flowers.

M. AZÉDARACH L. Lvs. deciduous, glabrous, lfts. obliquely lance-ovate, acuminate, serrate. S. States. 30—40f. Fol. light; fls. lilac; drupes as large as cherries. † W. Ind.

2. **SWIETÈNIA** MAHOGONI, L. MAHOGANY TREE. A large and beautiful tree growing in South Florida, Mexico, and the Isthmus. 80—100f. The reddish-brown ornamental wood is well known. Lvs. smooth, abruptly pinnate, with 6—10 lance-ovate lfts. Fls. small, yellowish, in panicles, 5-parted. Pod size of a goose-egg, ∞-seeded.

ORDER XXVIII. LINACEÆ. FLAXWORTS.

Herbs with entire, simple leaves, and no stipules; with *flowers* regular, symmetrical, and perfect, 5-(rarely 3 or 4)-parted. *Calyx* strongly imbricated in the bud, corolla contorted. *Stamens* definite, hypogynous, alternate with the petals. *Styles* distinct, with capitate stigmas, and each cell of the capsule more or less divided by a false dissepiment into two 1-seeded compartments. *Seeds* with little or no albumen, attached to axile placentæ. Figs. 10, 11, 130, 136, 469.

LINUM, L. FLAX. Sepals, petals, stamens, and styles 5, the latter rarely 3. Caps. 6–10-celled. Seeds 10, suspended, mucilaginous. Herbs with a bark of strong fibres, and simple, sessile leaves.

Flowers yellow, small (2—7′′ broad). Species ①, native. June—August...(*a*)
  a Sepals entire, 1-veined, as long as the depressed or globous capsule...Nos. 1—4
  a Sepals glandular-fringed, longer than the globular-ovoid capsule.......Nos. 5, 6
* Flowers blue, large (1′ broad). In fields and gardens.......................Nos. 7, 8
* Flowers large, showy, red or yellow. Garden exotics.....................Nos. 9, 10

1 **L. Virginiànum** L. Sts. teretish, erect, corymbous above, branches short, spreading, terete; lvs. oblong to lanceolate, mostly scattered; fls. 4–5′ broad; caps. depressed, styles distinct. Woods and hills. 2f. *Prof. Porter* distinguishes No. 2 from this.

2 **L. striàtum** Walt. St. *striate*, often clustered; branches short, ascending, sharply about 4-angled; lvs. lance-oblong, the lower mostly opp. Fls. and fr. as in No. 1. Com.

3 **L. simplex** Wood. Stem single, terete, corymbed at top, branches subterete; leaves linear-subulate, erect, scattered; caps. globular; sty. distinct; fls. 3′′, few. S-W. 18′.

4 **L. diffùsum** Wood. Stems very slender, ascending, with long, filiform, *diffuse*, angular branches; lvs. veiny, lance., spreading, 9–12′′; fls. 2′′ broad; pod depressed. W.

5 **L. sulcàtum** Riddell. St. and branches *sulcate*, strict, erect; lvs. lin., erect; sep. 3-veined, acuminate; sty. united below. Conn. to Ill., and S. 1—1¼f. (L. rigidum C-B.)

6 **L. rígidum** Ph. Stems low and branches rigidly erect, angular-sulcate; lvs. linear-subulate, erect; sepals lance-linear, twice longer than the pod. Iowa, Min., and W.

7 **L.** USITATÍSSIMUM L. *Common Flax.* ① Leaves lance-linear; panicle corymbous; flowers axillary; petals crenate. 2f. The strong bark yields *linen.* § Europe.

8 **L.** PERÉNNE L. ♃ Leaves linear; flowers supra-axillary and terminal; petals retuse, light blue. California! and Europe. Flowers numerous and showy.

9 **L.** GRANDIFLÒRUM. Leaves lance-elliptical; flowers red; styles 5. N. Africa. 10′.

10 **L.** TRÍGYNUM. Leaves elliptical; flowers yellow; styles 3. E. India. 1f.

ORDER XXIX. ZYGOPHYLLACEÆ. BEAN CAPERS.

Herbs, *shrubs*, or *trees*, with leaves opposite, mostly pinnate (not dotted) and stipulate. *Flowers* 4- or 5-merous, corolla imbricate or convolute in bud. *Stamens* twice as many as the petals, hypogynous, distinct, each often with a scale. *Ovary* compound; style and stigma 1 · fruit and seeds as in Linaceæ.

Herbs. Disk annular, 10-lobed. Fruit of 5—12 indehiscent carpels..................TRIBULUS. 1
Trees. Disk inconspicuous. Fruit of 2—5 dehiscent, 1-seeded carpels.................GUIACUM. 2

1. **TRÍBULUS**, L. Sep. and pet. 5, imbricated. Stam. 10, the 5 alternate with the petals placed inside of hypogynous glands. Ov. sessile, cells 1–5-seeded, separating into nutlets.—Loosely branched, prostrate herbs, with abruptly pinnate leaves. Flowers solitary (yellow).

1 **T.** (Kallstrœmia) **maximus** L. Lfts. 3 or 4 pairs, oblong or oval, oblique, the terminal pair largest; nutlets 10, tubercled, 1-seeded. Ga. Fla. 1—2f.

2 **T. cistoìdes** L. Lfts. 5—8 pairs, linear-lanceolate, subequal; ped. elongated, with one large flower; nutlets 5, spiny, 2-5-seeded. Fla. 2f.

2. **GUÌACUM**, Plum. LIGNUM-VITÆ. Sep. and pet. 4 or 5, deciduous, imbricated. Stam. 8—10. Ovary stipitate, 2–5-celled, cells many-ovuled, in fruit 1-seeded. ♄ ♄ Wood hard and resinous. Lvs. abruptly pinnate. Ped. in pairs, between the stipules, 1-flowered.

G. sánctum L. Branches jointed; lfts. 3 or 4 pairs, oblong, oblique, entire, mucronate; ped. short; pet. obtuse, blue. S. Fla. 20f. Bark white.

ORDER XXX. GERANIACEÆ. GERANIA.

Herbs or *shrubs* with perfect, hypogynous, symmetrical and regular, or irregular, 3–5-merous flowers. *Stamens* as many or twice as many as the sepals, often some of them abortive or rudimentary. *Carpels* as many as the sepals, 1–few-seeded, mostly separating from the persistent axis at maturity.—A large and rather incongruous order, as now constituted (by Bentham and Hooker), including the following tribes, heretofore regarded as orders. Figs. 27, 28, 172, 243, 265, 270, 315, 350, 497.

§ Flowers regular.—*a* Styles 5. Carpels several-seeded. TRIBE I.
—*a* Style 1.—*b* Sepals valvate. Fruit beakless. TRIBE II.
—*b* Sepals imbricate. Fruit beaked. TRIBE III.
§ Flowers irregular.—*c* Petals perigynous. Stamens 7 or 8. TRIBE IV.
—*c* Petals hypogynous. Stamens 5, short. TRIBE V.
I. OXALIDEÆ. Symmetrical. Stamens 10 +. Petals convolute. Pod 5-celled.....OXALIS. 1
II. LIMNANTHEÆ.—Symmetrical. Stamens (10 in LIMNANTHES, No. 3) 6 in........FLŒRKEA. 2
III. GERANIEÆ.—Stamens 10 +, 5 often sterile. Glands between the petals. Fruit a regma..(*e*)
e Stamens 10, all antheriferous. Tail of carpels beardless........................GERANIUM. 3
e Stamens 5 antheriferous. Tail of the carpels bearded..........................ERODIUM. 4
IV. PELARGONIEÆ.—Sepals spurred behind. Glands 0. Stamens declined..(*f*)
f Spur adnate to the pedicel. Fruit rostrate,—a regma..........................PELARGONIUM. 5
f Spur free. Fruit not beaked. Carpels 1-seeded, separating....................TROPÆOLUM. 6
V. BALSAMINEÆ.—Sepals spurred behind. Pod opening elastically...............IMPATIENS. 7

1. **ÓXALIS**, L. WOOD SORREL. (*'Οξυς*, acid: the herbage is sour.) Sep. 5, distinct or united at base. Pet. contorted, much longer than the calyx. Sty. 5, capitate. Caps. oblong or subglobous. Carp. 5, 1 to several-seeded. Mostly ♃, with palmately trifoliate leaves and inversely heart-shaped leaflets. Figs. 265, 270, 497.

1 **O. Acetosélla** L. Acaulescent; scape longer than the leaves, 1-flowered; leaflets broad-obcordate with rounded lobes; styles as long as the inner stamens; root dentate, scaly. ♃ Woods, Can. and N. States. 6′. Flowers white-purple. June.

2 **O. violàcea** L. Bulbous at base, acaulescent; scape umbelliferous; flowers nodding; tips of the calyx fleshy; styles shorter than the outer stamens. ♃ An elegant species in rocky woods. 5—8′. Flowers violet-purple. May.

3 **O. strícta** L. Caulescent; st. branching; ped. umbelliferous, longer than the petioles; style as long as the inner stamens; flowers yellow. ① Fields. 3—9′. Common.

4 **O.** FLAVA. Scapes 6′, 1-flowered; leaflets 6—10, linear; petals yellow, 1′ long. S. Afr.

5 **O.** RÓSEA. Stem erect, 8′; lfts. 3, obcordate; pet. roseate, 1′, toothed; fls. many. Chili.

6 **O.** VERSÍCOLOR. St. 3′; lfts. 3, linear, emarginate; pet. crimson-striped outside. S. Afr.

2. **FLŒ́RKEA,** Willd. FALSE MERMAID. Sep. 3, longer than the 3 petals. Glands 3. Stam. 6. Ovaries 3, tuberculate. Style 2-cleft. Fruit separating into 3 achenia. ① Small aquatics, with pinnately-divided leaves.

F. proserpinacoìdes Lindl.—By streams and lakes, Vt. to Penn., and W. 6—10′. Prostrate; lvs. alternate; lf. segm. 3—5; pet. white, shorter than the sepals; ach. 1—3.

3. **LIMNANTHES,** Br. Sepals 5, valvate. Pet. 5, convolute, with 5 glands. Stamens 10. Style 1. Ovary deeply 5-lobed, separating 5 achenia in fruit.—Herbs with pinnate leaves and cut-lobed leaflets. Summer.

L. DOUGLÁSII. Stems low, diffuse, with numerous axillary flowers 1′ broad; petals wedge-oblong, yellow, edged with white, notched at the end. California.

4. **GERÁNIUM,** L. CRANE'S BILL. Sep. and pet. 5, regular. Stam. 10, all perfect, the 5 alternate ones longer, and each with a gland at its base. Fruit at length separating from the axis into 5 achenia, and uplifted on the smooth curving styles.—Herbs. Ped. 1-3-flowered. Fig. 172.

* Petals entire, twice as long as the awned sepals, purplish... ....Nos. 1, 2
* Petals emarg. or 2-lobed, not longer than the sep., roseate. May—Aug...Nos. 3—6
European perennials, cultivated, hardy, ornamental.................No. 7

1 **G. maculàtum** L. Stem erect, angular, dichotomous, retrorsely-pubescent; leaves palmately 3-5-lobed, lobes cuneiform and entire at base, incisely serrate above, radical ones on long petioles. ♃ Woods. 2f. Flowers 1′, purple. April—June.

2 **G. Robertiànum** L. *Herb Robert.* Stems weak, reddish, diffuse, hairy; leaves pinnately 2-parted to the base, the segments pinnatifid, and the pinnæ incisely toothed; capsule rugous, seeds smooth. ② Rocky places, Can. to Va. 1—2f. Jn.—Aug.

3 **G. Caroliniànum** L. Erect, at length diffuse, hairy; leaves 5-7-parted; segm. 3-lobed, lobes entire or incised; ped. short, clustered at the ends of branchlets; sepals awned; fruit hairy; seeds *obscurely* reticulated. ① Hills, dry or rocky. ½—2f.

4 **G. dissèctum** L. Diffuse, pubescent; lvs. 5- or 7-parted, segm. linear, many-cleft; seeds *strongly* reticulated. ① Fields: rare. 6—12′. Fruit some hairy. § Europe.

5 **G. pusíllum** L. Procumbent, puberulent; lvs. round-reniform, 7-parted, segments 3-cleft; sepals *awnless;* seeds smooth. ① Waste grounds, N. Y., Mass. 1f. § Eur.

6 **G. columbìnum** L. Slender, decumbent, with long, filiform flower-stalks; sep. awned, enlarged after flowering; fr. glab.; lvs. and sd. as in No. 4. Penn. (Porter). §

7 **G.** SANGUÌNEUM. Erect, diffuse; leaf-lobes 3-cleft, linear; ped. 1-flowered; flowers red, large. β. LANCASTRIÉNSE is prostrate, with smaller (1′) purple flowers, very elegant.

5. **ERÒDIUM,** L'Her. HERON'S BILL. Sep. and pet. 5, regular. Stam. 10, the 5 shorter ones sterile. Styles in fruit spirally twisted and bearded.

E. cicutàrium Sm. Diffuse, hairy; leaves pinnately divided, segments sessile, pinnatifid, incised, acute; ped. several-flowered; petals equal, red. ① Lake shores, N. Y.: rare. In California it is one of the chief forage plants. May, June. § Europe.

6. **PELARGÒNIUM,** L'Her. STORK'S BILL. GERANIUM. Sepals 5,

the upper one ending in a nectariferous tube extending down the pedicel. Petals 5, irregular, longer than the sepals. Filaments 10, 3 or 5 of them sterile. ♄ or herbs. A large and ornamental genus, chiefly S. African, everywhere cultivated. Lower leaves (in plants raised from the seed) opposite, upper alternate. Figs. 243, 350.

§ Filaments 10, the alternate ones bearing anthers. Upper petals larger..........Nos. 1, 2
§ Filaments 10, of which 7 bear anthers, and 3 are sterile...(*a*)
  a The 2 upper petals smaller, all scarlet, 1-colored. Shrubby.............Nos. 3—5
  a Petals nearly equal in size, mostly variegated...(*b*)
    b Stemless. Root tuberous. Leaves laciniate. Flowers brown.......Nos. 6, 7
    b Stems shrubby.—*c* Lvs. cordate, palmate, lobed. Flowers small.....Nos. 8, 9
      —*c* Lvs. peltate or cordate, 5-lobed, smooth.............No. 10
  a Two upper petals longer and broader. Stems shrubby...(*d*)
    d Flowers white, the 2 upper petals striped with red.................Nos. 11, 12
    d Flowers purple.—*e* Leaves undivided.............................Nos. 13, 14
      —*e* Leaves divided below the middle.............Nos. 15—17

1 P. TRÍCOLOR. Lvs. lanceolate, cut-dentate; 3 lower pet. white, 2 upper purp.-blk. 18′. ♃
2 P. CORIANDRIFÒLIUM. Lvs. bipinnate; pet. white, upper purp.-veined, very large. 1f. ②
3 P. ZONÀLE. *Horse-shoe G.* Lvs. orbicular-cordate, slightly lobed, toothed, zoned; stem fleshy, shrubby; petals cuneiform; flowers umbelled. 2—3f. Numerous varieties.
  β. MARGINÀTUM. Silver-edged; the leaves bordered with white.
4 P. ÍNQUINANS. Lvs. round, reniform, scarcely lobed, crenate viscid; pet. obov. 2—3f.
5 P. FOTHERGÍLLII. Lvs. renifm., 5-lobed, crenate, zoned; stip. toothed, ciliate; pet. obov.
6 P. FLÀVUM. *Carrot-leaved Geranium.* Lf. lobes many, lin., hairy: fls. brownish-yell.
7 P. TRISTE. *Mourning Ger.* Lf. lobes lin., acute; pet. dark-green, obl., obovate. 1f.
8 P. FRAGRANS. *Nutmeg G.* Branches thick velvety, lvs. very soft; stip. subulate. Fls. w.
9 P. ALCHEMILLOÌDES. Villous; lvs. 5-lobed; peduncle few-flowered; fls. pink-colored.
10 P. PELTÀTUM. *Ivy-leaved G.* Br. fleshy; lvs. more or less peltate; fls. purplish.
11 P. GLAUCUM. Glabrous, glaucous; lvs. lanceolate, entire; ped. 1–2-flowered. 3f.
12 P. GRANDIFLÒRUM. Glab., glaucous; lvs. 5-lobed, toothed at end; fls. very large. 3f.
13 P. BETULÌNUM. Smoothish; lvs. ovate, unequally serrate; ped. 2-4-flwd. Pale. 3f.
14 P. WATSÒNII. Lvs. orbicular, cordate, some lobed, dentate; fls. large, varieg. 3f.
15 P. GRAVÈOLENS. *Rose Ger.* Lvs. palmately 7-lobed; lobes toothed, revolute, very rough at the edge; umbels many-flowered, capitate. 3f. Very fragrant.
16 P. RÁDULA. Lvs. palmate, rough, lobes narrow, rolled at edge, pinnatifid with linear segments; umbels few-flowered. 3f. Fragrance mint-like.
17 P. QUERCIFÒLIUM. Hispid; lvs. sinuate-pinnatifid, often spotted, cordate at base. 3f.

7. **TROPÆOLUM,** L. INDIAN CRESS. NASTURTION. Fls. irregular. Sep. 5, produced behind into a free spur. Pet. 5, the 2 upper exterior, different from the 3 lower. Stamens 8, free, unequal, perfect. Style 1. Ov. 3-celled, in fruit separating from the short axis into 3 hardened achenia. ♄ Leaves alternate. Stipule 0. Flowers showy. S. Am.

1 T. MAJUS L. *Nasturtion.* Lvs. peltate, roundish, repand on the margin; pet. obtuse, the 3 lower fringed and long-clawed at base. Flowers orange, scarlet, crimson, &c.
2 T. MINUS. *Smaller*, erect; petals pointed, yellow to white, or variegated. Peru.
3 T. LOBBIÀNUM. Leaves peltate, reniform, wavy, fixed near the base; petals crenate, rounded, the 2 lower fringe-toothed, all shades of red. Columbia.
4 T. PEREGRÌNUM. *Canary Bird.* Leaves deeply 5–7-lobed, lobes toothed; spur hooked; petals light yellow, 2 of them large and much lobed. A tall climber.

8. **IMPATIENS,** L. TOUCH-ME-NOT. Sepals colored, 4 (the upper one double), the lowest saccate and spurred. Petals apparently 2, each of them 2-lobed (double). Stamens 5, short, the anthers cohering at

apex; caps. often 1-celled by the obliteration of the dissepiments, 5-valved, bursting elastically.—Sts. smooth, succulent, tender, subpellucid, with tumid joints. Lvs. simple, alternate, serrate. Figs. 27, 28, 315.

1 **I. pállida** Nutt. Lvs. oblong-ovate; ped. 2-4-flowered, elongated; lower gibbous sepals dilated-conical, broader than long, with a very short, recurved spur; fls. pale yellow, sparingly dotted. ① Wet shades. 3—4f. Aug.

2 **I. fúlva** Nutt. Lvs. rhombic ovate; ped. 2-4-flowered, short; lower gibbous sepal acutely conical, longer than broad, with an elongated, closely reflexed spur; fls. deep orange, spotted. ① Damp grounds. 2—3f. July.

3 **I.** BALSAMÌNA L. *Balsamine.* Lvs. lanceolate, serrate, upper ones alternate; ped. clustered; spur shorter than the flower. ① E. India. Fls. large, white and red.

ORDER XXXI. RUTACEÆ. RUEWORTS.

Herbs or generally *shrubs* or *trees*, with the exstipulate leaves dotted with transparent glands containing aromatic or acrid oil. *Flowers* regular, 3–5-merous, hypogynous, perfect or polygamous. *Stamens* as many or twice as many as the sepals. *Pistils* 2—5, separate or united, styles united. *Fruit* capsular or separating into its component, 1–2-seeded *carpels.*

§ RUTEÆ. Flowers perfect. (Herbs. Stamens 10.)..(*a*)
a Petals equal, concave. Capsule 5-lobed................RUTA. 1
a Petals unequal, clawed. Capsules separable............DICTAMNUS. 2
§ ZANTHOXYLEÆ. Flowers ♀ ☿ ♂. (Trees, shrubs)..(*b*)
b Pistils 3—5, separate below. Stamens 3—6.........ZANTHOXYLUM. 3
b Pistils 2, united. Samara 2-seeded................PTELEA. 4

1. RÙTA, L. RUE. Calyx of 4 or 5 sepals, united at base. Petals 4 or 5, concave, obovate, distinct, torus surrounded by 10 nectariferous pores. Stamens 10. Capsule lobed. ♃ ♄, mostly European.

R. GRAVÈOLENS L. *Common Rue.* Suffruticous, nearly glabrous; leaves 2—3 pinnately divided, segm. oblong, obtuse, terminal ones obovate-cuneate, all entire or irregularly cleft; fls. terminal, corymbous; pet. entire. 3f. Greenish.

2. DICTÁMNUS, L. FRAXINELLA. Calyx of 5, deciduous sepals; petals 5, unguiculate, unequal; filaments 10, declinate, with glandular dots; capsules 5, slightly united. ♃ Native of Germany.

D. ÁLBUS Willd. St. simple; lvs. pinnate, the rachis more or less winged; fls. in a large, terminal, erect panicle.—In gardens. 1—2f. Fls. showy.

β. RUBRA. Fls. purple; rachis of the leaves winged.

3. ZANTHÓXYLUM, L. PRICKLY ASH. (Ξανθὸς, yellow, ξύλον, wood.) Sepals 4 or 5, rarely obsolete. Petals 4 or 5. Sta. as many as the petals in ♂, rudimentary in ♀. Pistils 3 to 5, distinct below, with coherent styles, in fruit crustaceous, 2-valved, 1 or 2-seeded. ♄ ♄ With sharp prickles, pinnate leaves, and small, greenish flowers.

1 **Z. Americànum** Mill. Prickly; lfts. 9—11, ovate, sessile, equal at base; umbels axillary; sep. obsolete, pet. 5. Woods. 10—12f. Flowers before leaves. April.

2 **Z. Caroliniànum** Lam. Prickly; lfts. 7—13, fulcate-lanceolate, very inequilateral, petiolulate; panicles terminal; sep. minute; bark warted around the prickles. S. States. Tree, 20—40f. Bark intensely pungent to the taste. May.

β. fruticòsum. Shrub; lvs. ovate-oblong, scarcely pointed; ovaries 2. S.
3 **Z. Floridànum** N. *Satin-wood.* Unarmed; lfts. 5—7, ♀ ovate-lanceolate, ♂ elliptical, obtuse; fls. minute; carp. 1—2, 1-seeded, obovoid. S. Fla.

4. **PTÈLEA,** L. SHRUB TREFOIL. (*Πτελέα,* the elm-tree; from the resemblance of the fruits.) ♀ ☿ ♂. Sepals 3 to 6, mostly 4, much shorter than the spreading petals. ♂ Stamens longer than the petals and alternate with them, very short and imperfect in ♀. Ovary of 2 united carpels. Stig. 2. Fruit 2-celled, 2-seeded samaræ, with a broad, orbicular margin. ♄ Lvs. 3–5-foliate. Fls. cymous.

1 **P. trifoliàta** L. Lvs. 3-foliate, lfts. sessile, ovate, short-acuminate, lateral ones inequilateral, terminal ones cuneate at base; cymes corymbous; stam. mostly 4; style short. Rocky places, N. Y. S. and W. 6—8f. Fls. white, odorous. June.
β. mollis. Young branches, petioles and leaves beneath, soft-downy and hoary. S.
2 **P. Baldwinii** T. & G. Lvs. glabrous, very small; lfts. sessile, oval, obtuse; stam. 4; stig. sessile. E. Fla. 1f. Branches numerous and scraggy. Lvs. 1′.

ORDER XXXII. AURANTIACEÆ. ORANGEWORTS.

Trees or *shrubs*, glabrous, abounding in little transparent receptacles of volatile oil, with *leaves* alternate, 1–3-foliate or pinnate. *Flowers* regular, 3–5-merous. *Stamens* with flat filaments, distinct or cohering in one or several sets. *Ovary* compounded of several united carpels. *Style* 1. *Fruit* (hesperidium) many-celled, pulpy, covered with a thick rind. *Albumen* 0. *Cotyledon* thick. Figs. 37, 363.

CITRUS, L. (*Κίτριον,* the citron; the fruit of one of the species.) Sepals and petals in 5's. Anthers 20, or some other and higher multiple of 5, versatile, the connectile articulated to the filament. Filaments dilated at base, polyadelphous. Berry 9–18-celled. ♄ ♄ A noble E. Indian genus. Lvs. 1-foliate, entire, evergreen. Petiole often winged.

1 **C. vulgàris** Risso. *Bitter Orange.* Petiole winged; lvs. elliptical, acute, crenulate; stam. 20; fruit globular, with a thin rind and bitter pulp. S. Fla. 15—20f. § Asia.
2 **C.** AURÁNTIUM. *Sweet Orange.* Petiole scarcely winged; lft. oblong, acute, crenulate; sta. 20; fr. globous, with a thin rind and sweet pulp. 30f.
3 **C.** LIMÉTTA. *Lime.* Petioles not at all winged; lft. ovate-orbicular, serrate; stam. 30; fr. globous, with a sweet pulp, and a protuberance at top. 15f.
4 **C.** LIMÒNUM. *Lemon.* Petioles somewhat winged; sta. 35; fr. oblong-spheroid, with a thin rind and very acid pulp. 20f. Fr. yellow.
5 **C.** DECÙMANA. *Shaddock.* Petioles broadly winged; lft. obtuse, emarginate; fr. very large, with a thick rind. 15f. Fruit green-yellow. 5′ diam.

ORDER XXXIV. SIMARUBACEÆ. QUASSIAWORTS.

Trees or *shrubs* with bitter bark, alternate, exstipulate, pinnate leaves, and small, diclinous, regular, hypogynous 3–5-merous flowers. *Stamens* as many or twice as many as the *petals*, inserted on the hypogynous disk. *Styles* 2—5. *Ovaries* 2–5-lobed or carpelled. *Fruit* 1—5 one-seeded drupes or samaras.

§ Leaves abruptly pinnate. Flowers diœcious. Styles united. Fruit baccate....... ....SIMIRUBA. 1
§ Leaves odd-pinnate. Flowers polygamous. Styles distinct. Fruit a samara...........AILANTHUS. 2

1. **SIMARÙBA,** Aubl. QUASSIA. (Its name in Guiana.) ♄ ♄

S. gláuca DC. Leaflets 4—8, alternate, entire, obtuse, coriaceous. S. Fla. Tree, 40f.

2. **AILÁNTHUS,** Desf. CHINESE "TREE-OF-HEAVEN." (*Ailanto*, its name in China.) ♀ ☿ ♂ Sep. 5. Pet. 5. ☿ Stam. 2—3. Ov. 3—5. Sty. lateral. Fr. 1-celled, 1-seeded samaræ, with oblong margins. ♂ Stam. 10. ♀ Ovaries, styles, and samaræ as in ☿. ♄ ♄ Oriental, with odd-pinnate leaves. Flowers in panicles.

A. GLANDULÒSA Desf. Lfts. glabrous, 21—41, ovate or oblong-lanceolate, acuminate, with 1 or 2 obtuse, glandular teeth each side at base, terminal one long-petiolate. Parks, &c. 40—60f. Flowers greenish, ill-scented. June.

ORDER XXXV. BURSERACEÆ. BURSERIDS.

Trees and *shrubs* abounding in balsam or resin, with exstipulate, compound, dotted leaves, and small, regular, racemed or panicled flowers. *Calyx* 3-5-cleft. *Petals* 3—5. *Stamens* twice as many. *Ovaries* free, 1-5-celled. *Stigmas* 2-5-lobed, ovules 2 in each cell. *Fruit* drupaceous, indehiscent, rarely capsular. *Seeds* pendulous, exalbuminous.

* Flowers perfect, 4-parted. Stamens 8, hypogynous. Leaves opposite......... ....AMYRIS. 1
* Flowers polygamous, 4 and 6-parted. Stamens 8—10 ; disk crenate. Leaves alternate....BURSERA. 2

1. **AMÝRIS,** L. BALM-OF-GILEAD. (*Μύρρα,* myrrh; from its perfumed gum.) ♄ ♄ Flowers in panicles, white.

A. Floridàna N. *Torch-wood.* Shrub; lvs. opposite, trifoliate, on short petioles; lfts. ovate, obtuse, entire, petiolulate; drupes small, globular. E. Fla.

2. **BÚRSERA,** L. (To *Joachin Burser*, an Italian botanist.) ♄

B. gummífera Jacq. Lfts. 3—9, petiolulate, ovate, acum., entire; fls. racemed. Fla.

ORDER XXXVI. ANACARDIACEÆ. SUMACS.

Trees or *shrubs* with a resinous, gummy, caustic, or even milky juice. *Leaves* alternate, simple, or ternate, or unequally pinnate, without pellucid dots. *Flowers* with bracts, commonly diœcious, small. *Sepals* 3—5, united at base, persistent. *Petals* of the same number (sometimes 0), imbricated. *Stamens* as many as petals, alternate with them, perigynous. *Ovary* 1-celled, free. *Ovule* 1. *Stigmas* 3. *Fruit* a berry or drupe, usually the latter, and 1-seeded. *Albumen* 0.

RHUS, L. SUMAC. (The ancient name, from Celtic, *rhudd*, red?) Calyx of 5 sepals united at base. Pet. and stam. 5. Sty. 3. Stig. capitate. Fruit a small, 1-seeded, subglobous, dry drupe.—Small trees or shrubs. Leaves alternate, mostly compound. Flowers often, by abortion, imperfect, greenish.

§ Leaves simple. Flowers perfect (or all abortive in cultivation)..........Nos. 10, 11
§ Leaves compound. Flowers diœcious. A tree. South Florida................No. 9
§ Leaves compound. Flowers polygamous...(*a*)
  a Flowers in clustered spikes *preceding* the trifoliate leaves..................No. 8
  a Flowers in axillary panicles, *with* the 3-13-foliate lvs. Poisonous.....Nos. 5—7
  a Flowers in terminal thyrses, *with* the 9-31-foliate leaves...(*b*)
    b Common petiole winged between the leaflets.........................No. 4
    b Common petiole not winged...Nos. 1—3

1 R. glàbra L. Lvs. and branches glabrous; lfts. 11—31, lanceolate, acuminate, acutely serrate, whitish beneath; fr. red, with crimson hairs. Thickets and pastures. 6—15f. The fruit hairs are extremely acid, and dye red. June, July.

2 R. týphina L. Branches and petioles densely villous; lfts. 11—31, oblong-lanceolate, acuminate, acutely serrate, pubescent beneath; fruit red, with crimson hairs. Rocky soils. 10—20f. Branches thick, straggling. Drupes acid. Wood yellow. June.
  β. laciniàta. Lfts. irregularly gashed; panicles leafy. Hanover, N. H. (*Ricard.*)

3 R. pùmila Mx. Procumbent, villous-pubescent; lfts. 9—13, oval or oblong, coarsely toothed; drupes red, silky pubescent. N. Car. to Ga. Branches 1f high.

4 R. copallìna L. *Mountain Sumac.* Branches and petioles pubescent; lfts. 9—21, oval-lanceolate, mostly entire, unequal at base, common rachis winged; fls. in dense panicles; drupes red, hairy. Rocky hills. 2—8f. Thyrse sessile. July.

5 R. venenàta DC. *Poison Sumac. Dog-wood.* Very glabrous; lfts. 7—13, oval, abruptly acuminate, very entire; panicles loose, axillary, pedunculate; drupes greenish-yellow, smooth. Swamps. 10—15f. Flowers green. Very poisonous. June.

6 R. Toxicodendron L. *Poison Oak. Poison Ivy.* Erect, or decumbent; lvs. pubescent; lfts. 3, broadly oval, acuminate, angular, or sinuate-dentate; drupes smooth, roundish. Thickets, Can. to Ga. Perhaps runs into the next. June.

7 R. ràdicans L. *Climbing Ivy.* Stems climbing by means of innumerable radicating tendrils; leaflets ovate, smooth, entire. Ascending trees, 20—50f. Drupes dull white. Stems 1—2′ in thickness. June.

8 R. aromática Ait. *Sweet Sumac.* Lfts. sessile, incisely crenate, pubescent beneath, lateral ones ovate. terminal one rhomboid; fls. in close aments, preceding the leaves; drupe globous, villous. Copses. 2—6f. Flowers yellowish. May.

9 R. Metòpium L. Lfts. 3—7, smooth, entire, ovate, acumin.; drupes smooth. 30f.

10 R. cotinoìdes N. Smooth; lvs. oval, obtuse, entire, acute at base, thin, long-stalked; fls. minute, in loose, erect panicles; drupes smooth. Mts. Car. to Ark.

11 R. COTÌNUS. *Venetian Sumac. Smoke-tree.* Lvs. obovate, entire, thick; flowers mostly abortive, pedicels diffusely branched and hairy. Italy.

ORDER XXXVII. SAPINDACEÆ. MAPLEWORTS.

Trees, shrubs, or rarely *herbs,* with simple or compound, alternate or opposite leaves. *Flowers* mostly unsymmetrical, often irregular, 4 or 5-merous, with the *sepals* and *petals* both imbricated in the bud, with the *stamens* 5 to 10, inserted on a hypogynous or perigynous disk. *Ovary* 2 or 3-celled, and lobed with 1 or 2 (rarely more) ovules in each cell. *Embryo* mostly curved or convoluted, with little or no albumen. Figs. 100, 224, 230, 236, 237, 308, 312, 444, 515.

I. ACERINEÆ.—Leaves opposite. Flowers regular, diclinous. Fruit a double samara...(*a*)
  a Disk annular. Petals 4 or 5 or 0. Leaves simple, lobed......................ACER. 1
  a Disk obsolete. Petals none. Leaves pinnately compound....................NEGUNDO. 2
II. STAPHYLEÆ.—Leaves opposite. Flowers regular, perfect. Stamens 5.......STAPHYLEA. 3
III. HIPPOCASTANEÆ.—Leaves opposite. Flowers irregular. Stamens 7.......ÆSCULUS. 4
IV. SAPINDEÆ.—Leaves alternate. Flowers polygamo-diœcious...(*b*)

b Petals 5, regular. Ovules solitary. Fruit baccate. Trees..................SAPINDUS. 5
b Petals 5 or 4, regular. Ovules 2 or 3 in each cell. Trees. South Florida....HYPELATE.
b Petals 4, irregular. Trees. KŒLREUTERIA, No. 7..........Vines..........CARDIOSPERMUM. 6
b Petals 0. Ovules 2 in each cell. Capsules winged. Shrub. South Fla....DODONÆA.

1. ACER. MAPLE. (The ancient name, meaning sharp, vigorous.) Fls. polygamous. Cal. 5 (4–9)-cleft. Cor. 5 (4–9)-petalled or 0. Stam. 8 (4—12). Sty. 2. Samaræ 2-winged, united at base, by abortion 1-seeded. Leaves simple, palmately 5 (rarely 3–9)-lobed.

§ Flowers in dense, umbellate clusters, appearing *before* the leaves..........Nos. 1, 2
§ Flowers in pendulous corymbs, yellowish, appearing *with* the leaves.......Nos. 3, 4
§ Flowers in terminal racemes, greenish, appearing *after* the leaves...(*a*)
  a Shrubs or small trees, native. Leaves 3-lobed.......................Nos. 5, 6
  a Large trees, exotic, cultivated. Leaves 5–7-lobed...................Nos. 7, 8

1 **A. rùbrum** L. *Red Maple. Swamp Maple.* Lvs. cordate, acutely and incisely toothed, the sinuses acute, glaucous beneath; ped. elongated in fruit; pet. linear-oblong; ovaries and fruit smooth. Swamps. 30—80f. Flowers red. April.

*β. **tridens.*** Lvs. 3-lobed, rounded at base; flowers yellowish. N. J. to La. 20f.

2 **A. dasycárpum** Ehrh. *White Maple.* Lvs. truncated at base, unequally and incisely toothed, with obtuse sinuses, white and smooth beneath; fls. greenish, with downy ovaries; petals 0; fruit divergent. Woods. 50f. Mar. April.

3 **A. saccharìnum** L. *Sugar Maple. Rock Maple.* Lvs. subcordate at base, acuminate, remotely toothed, with rounded and shallow sinuses, glaucous beneath; fls. pedunculate, pendulous. Rocky hills, N. 40—70f. A noble tree.

4 **A. nìgrum** Mx. *Black Maple. Sugar Tree.* Lvs. cordate, with the sinus closed, lobes divaricate, sinuate-dentate, paler beneath, with the veins beneath and the petioles pubescent; flowers on long, slender pedicels. Vt. to Ind. 30—70f. April.

5 **A. Pennsylvánicum** L. *Striped Maple. Whistle-wood.* Lvs. with 3 acuminate lobes, rounded at base, sharply denticulate, smooth; rac. simple, pendulous. Can. to Ga. and Ky. 10—15f. Bark striped, green and black. May.

6 **A. spicàtum** Lam. *Mountain Maple-bush.* Lvs. 3–5-lobed, acute, dentate, pubescent beneath; racemes erect, compound. Woody hills. 5—8f. Flowers greenish.

7 **A.** PSEUDO-PLÁTANUS L. *Sycamore.* Lvs. cordate, glabrous, glaucous beneath, lobes acute, unequally dentate; raceme pendulous; fruit smooth. Europe. 40f.

8 **A.** MACROPHÝLLUM Ph., with large, very deeply 5-lobed leaves, nodding racemes, and hispid fruit. Oregon. 30—50f.

2. NEGÚNDO, Mœnch. BOX ELDER. ASH MAPLE. Flowers ♀ ♂. Corolla 0; ♀ flowers racemed, ♂ fascicled. Calyx, stamens, and fruit as in the last genus. Leaves compound, pinnately 3–5-foliate.

N. aceroìdes Mœnch. Lfts. ovate, acuminate, remotely and unequally dentate; ♀ rac. long and pendulous; fruit oblong, with large wings dilated upward. A handsome tree, 20—40f. N. Y. to Car. and Cal.! April.

3. STAPHYLÈA, L. BLADDER-NUT. (A Greek word, meaning a cluster of grapes; from the form of the fructification.) Fls. ☿. Calyx of 5, colored, persistent sepals. Pet. and sta. 5. Styles 3. Caps. 2—3, membranous and inflated, slightly cohering. Seeds not arilled. ♄ With opposite, 3–7-foliate lvs. and caducous stipules. Fig. 444.

S. trifòlia L. Lfts. 3, ovate, acuminate, serrate; fls. in drooping cymous panicles, white; pet. ciliate at base. Can. to Car. and Tenn. 6—10f. Caps. large. May.

4. ǼSCULUS, L. HORSE CHESTNUT. BUCKEYE. Calyx 5-toothed;

cor. irregular, 4 or 5-petalled; sta. 7 (6 to 8), distinct, unequal. Style filiform, ov. 3-celled, with 2 ovules in each cell. Fruit coriaceous, 2–3-valved, containing but one or very few large, smooth seeds. Cotyledons thick, bulky, inseparable. ♄ ♄ With opposite, digitate, 5–7-foliate leaves. Fls. paniculate, terminal. Fig. 100.

§ PAVIA. Fruit smooth. Petals 4, erect, the two upper clawed. *Buckeye.* .Nos. 1—3
§ ÆSCULUS *proper.* Fruit prickly. Petals 4 or 5, spreading................Nos. 4, 5

1 **Æ. Pàvia** L. Lfts. 5—7, shining, oblong-lanceolate; cuneate at base, short-acuminate, finely serrate; fls. red, very irregular in a lax, thyrsoid raceme; pet. as long as stamens; cal. half as long as the two shorter petals. S. 3—10f. Mar. April.

2 **Æ. parviflòra** Walt. Lfts. 5—7, obovate, acuminate, serrate, velvety canescent beneath; petals 4 white, somewhat similar and spreading, thrice shorter than the capillary stamens. S. 2—9f. Fls. very numerous.

3 **Æ. flàva** Ait. *Sweet Buckeye.* Lfts. 5—7, oblong or elliptic-ovate, acuminate, serrulate, pubescent beneath; fls. in thyrsoid, pubescent panicles; pet. very unequal, longer than the stamens. W. and S. 6—70f. Yellowish. April, May.

4 **Æ. glàbra** Willd. *Ohio Buckeye.* Lfts. 5, oval or oblong, acuminate, serrate or serrulate; fls. in lax thyrsoid panicles; pet. 4, half as long as the stamens. River banks, W. Tree 20—40f, ill-scented, with small, yellowish flowers. June.

5 **Æ.** HIPPOCÁSTANUM L. *Horse Chestnut.* Lvs. of 7 obovate lfts.; pet. 5, spreading; fruit prickly. Tartary. A noble tree, in parks, &c. June.

5. SAPÍNDUS, L. SOAP-BERRY. (That is, by syncope, *Sapo Indicus,* Indian soap.) Sep. 4 or 5. Pet. as many, or one less by abortion, appendaged inside with a gland, scale, or beard. Sta. 8—10. Stig. 3. Fruit 3, connate, globular, fleshy carpels, often by abortion 2 or 1. Seed large, solitary. ♄ Lvs. alternate, pinnate, exstipulate.

S. marginàtus Willd. Common petioles wingless; lfts. 9—18, ovate-lanceolate, long-pointed, very inequilateral, short-stalked, entire, glabrous, shining above; flowers in white, dense panicles. Ga. to Ark. 20—40f. Fruit globular.

6. CARDIOSPÉRMUM, L. HEART-SEED. (*Καρδία,* heart, *σπέρμα,* seed.) Sep. 4, two of them smaller. Pet. unequal, each with a scale at base. Sta. 8. Style 3-fid. Caps. membranous, inflated. ♭ Leaves biternate. Pedicels changed to tendrils.

C. Haliácabum L. Lfts. ovate-lanceolate, incisely lobed and dentate; fr. pyriform-globous, large, bladder-like. Banks of streams, S. and W. 4—6f. July. §

7. KŒLREUTÈRIA, Lam. (To *J. G. Köhlreuter,* a Russian botanist and author, 1755.) Sep. 5. Pet. 4, irregular. Sta. 8. Sty. exserted. Caps. inflated, 3-celled, cells 2-seeded. ♄ Lvs. alternate, pinnate, lfts. about 13, cut-serrate. Flowers yellow, in large panicles.

K. PANICULÀTA.—China. 20—30f. Odd leaflet cut-lobed. A curious tree.

ORDER XXXVIII. CELASTRACEÆ. STAFF TREES.

Shrubs with simple leaves alternate or opposite, with *flowers* small, regular, 4 or 5-merous, perigynous, *sepals* and *petals* both imbricated in æstivation, *stamens* alternate with the petals, and inserted on a disk which fills the bottom of the calyx. *Carpels* 2—5, *styles* united. *Fruit* free from the calyx, with 2—5 cells. *Seeds* arilled, few, albuminous.

* Leaves alternate.—*a* Capsule dehiscent. Cells 2-ovuled. Vine........................CELASTRUS. 1
—*a* Capsule dehiscent. Cells 1-ovuled. Erect. S. Fla..............MAYTENUS.
—*a* Drupe dry, 2-celled, 2-seeded. Erect. S. Fla..................SCHAEFFERIA.
* Leaves opposite.—*b* Capsule 3–5-celled. Cells 2-ovuled..............................EUONYMUS. 2
—*b* Drupe 1-celled, 1-seeded (ovary 2–4-celled.) S. Fla..............MYGINDA.

1. **CELÁSTRUS,** L. STAFF-TREE. Fls. often imperfect. Sep. and pet. 5. Disk 5-lobed, bearing the 5 stamens on its edge. Caps. subglobous, or 3-angled, 3-celled. Seeds with an arillus, 1 or 2 in each cell. ♄ With alternate, deciduous lvs. and minute, deciduous stipules.

C. scándens L. St. twining; lvs. oblong, acuminate, serrate; rac. terminal; flowers diœcious. Woods. 20—40f. Arilled seeds scarlet, persistent in winter. June.

2. **EUÓNYMUS,** Tourn. BURNING BUSH. (*Εὖ,* good, *ὄνομα,* name.) Fl. perfect; calyx flat, of 5 (sometimes 4 or 6) united sepals. Corolla flat, inserted on the outer margin of the broad disk. Stamens 5, with short filaments. Caps. colored, 5-angled, 5-celled, 5-valved. Seeds wholly invested with a scarlet aril. ♄ ♄ Lvs. opposite, serrate. Flowers purple.

1 **E. atropurpŭreus** Jacq. Lvs. elliptic-ovate, petiolate, acuminate, finely serrate, puberulent beneath; ped. compressed, many-flowered; fls. usually 4-merous; capsule smooth, lobed. Woods. 4—10f. Fruit crimson. June. Varieties in cultivation have orange-red or even whitish fruit.

2 **E. Americănus** L. Branches 4-angled; lvs. oval and elliptic-lanceolate, acuminate, acute, or obtuse, smooth, subsessile; ped. round, about 3-flowered; fls. mostly pentamerous; caps. warty. Woods. 2—5f. Fruit dark red. June.

β. ***obovătus.*** Trailing; lvs. obovate, obtusish, petiolate. Ohio, &c.

γ. ***angustifŏlius.*** Lvs. linear-lanceolate, inequilateral, acute at each end. South.

3 **E.** EUROPÆUS, has smooth, shining, lance-oblong, serrate leaves, the flattened ped. 3-flowered; fls. 4-parted. Europe. Not hardy North.

ORDER XL. RHAMNACEÆ. BUCKTHORNS.

Shrubs or small *trees*, often spiny, with simple, alternate, stipulate *leaves*, with *flowers* regular, sometimes apetalous or otherwise imperfect; with the *stamens* perigynous, as many (4 or 5) as the valvate sepals, alternate with them, and opposite to the petals when they are present. *Disk* perigynous. *Capsule* or *drupe* with one albuminous seed in each cell.

* Leaves opposite or subopposite, with opposite branches...*a*
a Flowers small, in axillary clusters or umbels. S. Fla..............................SCUTIA.
a Flowers minute, spicate, in terminal panicles..SAGERETIA. 1
* Leaves alternate.—*b* Shrubs climbing by twining. Petals sessile........................BERCHEMIA. 2
—*b* Shrubs climbing by tendrils. Pet. short..........................GOUANIA. 3
* Leaves alternate.—*c* Clusters of (white) flowers terminal. Pet. unguiculate...............CEANOTHUS. 4
—*c* Clusters axillary. Pet. 4, 5, or 0, on the margin of disk..........RHAMNUS. 5
—*c* Clusters axillary. Pet. 5, under the 5-lobed disk. S. Fla..........COLUBRINA.

1. **SAGERÈTIA,** Brongn. (Named for *M. Sageret,* a French florist and veg. physiologist.) Calyx 5-cleft. Petals 5, cucullate. Sta. 5. Ovary immersed in the entire disk, with a 3-lobed stigma. Drupe 3-celled. ♄ With slender branches. Fls. in rigid, interrupted spikes.

S. Michăuxii Brongn. Branches at length spiny; leaves ovate or oblong-ovate, subsessile, shining, subentire. Sandy coasts, Car. to Fla. Trailing, 6—15f. October.

2. **BERCHÈMIA,** Necker. SUPPLE JACK. Calyx 5-parted. Pet. 5, convolute, enclosing the 5 stamens. Ovary half immersed in the disk, but free from it, 2-celled. Style bifid. Drupe oblong, with a bony, 2-celled nut. ♄ ♄ Unarmed. Lvs. pinnate-veined. Panicles terminal, small.

B. volùbilis DC. Climbing, glabrous; lvs. ovate, straight-veined, repandly serrate; drupe dark purple. Damp soils, S. Stem supple, 10—20f. May, June.

4. **CEANÒTHUS,** L. JERSEY TEA. RED-ROOT. Calyx tubular-campanulate, 5-cleft. Petals 5, saccate, arched, with long claws. Sta. mostly exserted. Style 3-cleft. Capsule obtusely triangular, 3-celled, 3-seeded, surrounded at base by the persistent tube of the calyx. ♄ ♄ Thornless. Fls. small, aggregated at the end of the branches.

1 **C. Americanus** L. Leaves oblong-ovate, or ovate, serrate, 3-veined; flowering branches leafy or leafless, elongated. Dry woods. 2—4f. June.

2 **C. ovàlis** Bw. Lvs. oval-lanceolate or narrowly oblong, with glandular serratures, 3-veined, veins pubescent beneath; thyrse corymbous, abbreviated. Vt. to Mich. 2—3f. Less common than No. 1. Lvs. smooth, shining. May.

3 **C. microphýllus** Mx. Diffusely branched, branches very slender; leaves minute, obovate, rigid, glabrous, strigous beneath. Pine-barrens, S. 1—2f. April.

β. serpyllifòlius. Very slender; branches filiform; lvs. oval (2—3″ long). S.

5. **RHÁMNUS,** L. BUCKTHORN. (The Greek name.) Calyx urceolate, 4 or 5-cleft. Pet. 4 or 5, notched, lobed, or entire, or sometimes wanting. Ov. free, not immersed in the thin torus, 2–4-celled. Styles 2—4, more or less united. Drupe containing 2—4 cartilaginous nuts. ♄ Lvs. alternate, rarely opposite. Fls. in axillary clusters.

§ Flowers tetramerous. Leaves with arcuate veinlets........................Nos. 1, 2
§ Flowers pentamerous. Leaves with the veinlets nearly straight...........Nos. 3, 4

1 **R. cathárticus** L. Thorny; lvs. ovate, denticulate-serrate; fls. fascicled; polygamo-diœcious, mostly tetrandrous; sty. 4, at apex distinct and recurved: fr. globular, 4-seeded. Hedges, rarely wild. 10—15f. Drupes black, cathartic. May +. § Eur.

2 **R. lanceolàtus** Ph. Thornless; lvs. lanceolate or oblong, acute at each end, the earlier ones obtuse; fls. 1—3 together; pet. 4, minute; sty. 2 at apex, distinct; drupe 2-seeded. Pa. to Iowa (Colman). Rare. 4—8f. May.

3 **R. alnifòlius** L'Her. Unarmed; lvs. oval, acute, serrate; ped. aggregate, 1-flowered; fls. mostly pentandrous and apetalous; sep. acute; styles 3, united, very short; fruit 3-seeded. Pa. to Can. 2—4f. June.

4 **R. Caroliniànus** Walt. Unarmed; leaves oblong-oval, serrulate, acute, paler beneath; fls. perfect, in short, axillary umbels, petals minute; stigmas 3; fr. 3-seeded. River banks, Va. to Fla. 7—15f. June.

ORDER XLI. VITACEÆ. VINES.

Shrubs with a watery juice, tumid nodes, and usually climbing by tendrils. *Flowers* small, regular, racemous, often polygamous or diœcious. *Calyx* minute, truncated, the limb obsolete or 5-toothed. *Petals* hypogynous, valvate in æstivation, as many as and opposite to the stamens. *Stamens* inserted on the disk which surrounds the 2-celled, 1-styled ovary. *Fruit* a berry, usually 4-seeded. *Seeds* bony. *Albumen* hard. Figs. 187, 250.

VITIS, L. GRAPE-VINES. (Celtic *gwyd*, a tree or shrub.) Petals 4 or

5, deciduous, cohering at the top, or distinct and spreading. Ovaries 2-celled, cells 2-ovuled. Fruit a globular berry, 1–4-seeded. ♄ Lvs. simple or compound. Ped. opposite the lvs. often changed to tendrils. Fls. small, clustered.

§ VITIS *proper*. Petals cohering at the top, and falling without expanding...*a*
§ CISSUS. Petals free, expanding before falling. Tendrils coiling, or 0...*b*
§ AMPELÓPSIS. Petals free, expanding. Tendrils with an adhesive foot.......No. 9
a Leaves beneath clothed with a whitish or rusty wool................Nos. 1, 2, 3
a Leaves glabrous except the veins, and green both sides...............Nos. 4, 5, 10
b Leaves simple, angular or entire.....................................No. 6
b Leaves pinnately compound...Nos. 7, 8

1 **V. labrŭsca** L. *Fox Grape. Isabella, Catawba.* Leaves broad-cordate, angular-lobed, hoary tomentous beneath; berries large. Woods. 30—80f. Fr. p. gr. or amb.

2 **V. æstivàlis** L. Lvs. broadly cordate, 3-5-lobed or palmate-sinuate, coarsely dentate, with scattered ferruginous hairs beneath; fertile racemes long, panicled, berries small. Shady banks. Fruit deep blue, small, ripe in September.

3 **V. Caribæa** DC. Hoary; lvs. round-cordate, 3-lobed or entire, smooth above. Fla.

4 **V. cordifòlia** Mx. *Frost Grape.* Lvs. cordate, acuminate, somewhat equally toothed, smooth, or pubescent beneath the veins and petioles; rac. loose, many-flwd.; berries small. River banks. 10—20f. Fruit blackish, ripe in November.

5 **V. vulpìna** L. *Muscadine. Scuppernong.* Lvs. (small) cordate, slightly 3-angled or lobed, shining on both sides, coarsely toothed, the teeth not acuminate; rac. composed of many capitate umbels. Va. to Fla. Fruit large, purple, few.

6 **V. indivìsa** Willd. Lvs. simple, cordate or truncate at the base, often angular-lobed; flowers 5-merous; berry 1 or 2-seeded. Swamps, S. Fruit small (2′′).

7 **V. bipinnàta** T. & G. Lvs. bipinnate, lfts. incisely serrate, glabrous; flowers 5-merous. S. States along rivers. Fruit small, black. No tendrils.

8 **V. incìsa** N. Lvs. 3-foliate, thick; lfts. 2-3-lobed; berry 1-seeded. Fla. to La.

9 **V. quinquefòlia** Lam. *Virginia Creeper.* Lvs. digitate, lfts. 5, oblong, acuminate, dentate; berries dark blue, smaller than peas, acid. Woods, thickets. 20—40f.

10 **V.** VINÍFERA L. *European Wine-grape.* Lvs. cordate, sinuately 5-lobed, glabrous; flowers all perfect. Europe. Many varieties.

ORDER XLII. POLYGALACEÆ. MILKWORTS.

Herbs or *shrubs*, with the leaves mostly simple and without stipules. *Flowers* irregular, unsymmetrical, hypogynous, perfect. *Sepals* 5, unequal, distinct, some or all of them colored. *Petals* 3, often 5, and 2 of them scale-like. *Stamens* 4 to 8, distinct, or cohering in a tube which is split on the upper side. *Ovary* superior, compound, with suspended ovules, united styles and stigmas. *Fruit* a 2-seeded pod. *Seeds* pendulous, with or without a caruncle and albumen.

Sepals 5, unequal, 2 larger, wing-shaped, petaloid. Petals 3. Stamens 8. ....POLYGALA. 1
Sepals 5, nearly equal. 3 of the 5 petals long-clawed. Stamens 4.....................KRAMERIA. 2

1. POLÝGALA, Tourn. MILKWORT. (*Πολύς,* much, *γάλα,* milk; said to favor the lacteal secretions of animals.) Fls. very irregular. Sep. 5, 2 of them wing-shaped and petaloid. Pet. 3, cohering by their claws to the filaments, lower one carinate and often crested on the back. Stam. 6 or 8, filaments united into a split tube. Anth. 1-celled. Caps. obcordate, 2-celled, 2-seeded, loculicidal. Sd. appendaged with a various caruncle at the hilum. Mostly herbs, bitter, and with simple leaves. Flowers often of two forms, the subterranean apetalous.

* Leaves alternate.—*a* Fls. purple, solitary, 2—4. Perennial........................ No. 1
—*a* Fls. purple, racemed, many. Biennial..................... Nos. 2, 3
—*a* Fls. white. Spike slender. Seeds hairy. Perennial.....Nos. 4, 5
—*a* Fls. purple. Spike capitate.—Caruncle double.............Nos. 6—8
—Car. appears simple. ①...Nos. 9—11
—*a* Fls. xanthic.—*b* Spikes solitary, large. Biennial........Nos. 12, 13
—*b* Spikes ∞, corymbed, small. Bien.....Nos. 14, 15
* Lvs. vertic. on the stem.—*c* Spikes acute, slender. Fls. greenish-white...Nos. 16, 17, 18
c Spikes obtuse, thick..(Shrubs, †. No. 22—25)..Nos. 19, 20, 21

1 P. paucifòlia L. St. simple, erect, naked below; lvs. ovate, acute, smooth; terminal fls. large, crested, radical ones apetalous. ♃ Woods. 3—4′. Flowers few, large (10″), very showy. May, June.

2 P. grandiflòra Walt. Ascending, pubescent; lvs. ovate-lanceolate to lance-linear, acute; fls. distant, pendulous after blooming, wings large, roundish, covering the fruit, keel as long as the wings (3″), crestless. ② ? Dry soils, S. 9—12′. May—Aug.

3 P. polýgama Walt. Sts. simple, numerous, glabrous; lvs. linear-oblong, mucronate, obtuse; fls. racemed, short-pedicelled, those of the stem winged, those of the root wingless; keel cristate. ② Fields. 6—12′. Rac. showy. Fls. 2″. June, July.

4 P. Sénega L. *Seneca Snake-root.* St. erect, smooth, simple, leafy; lvs. lanceolate, tapering at each end; fls. slightly crested, in a terminal spike-form, slender raceme. ♃ Woods, W. States, rare in E. 8—14′. Spike 1—2′. Leaves 1—2′. July.

β. ***latifòlia.*** Leaves ovate, acuminate at each end. Leaves 2—3′. Ind.

5 P. alba N. St. angular, branched above; lvs. linear; spike lance-linear, pointed, on a long stalk. ♃ Ala. to La. 6—12′. Spikes 1—3′.

6 P. setàcea Mx. Sts. filiform, simple, apparently leafless (lvs. minute, deltoid-acum.); spike (small) oblong, acute; wings short-pointed, shorter than the petals; caruncle enclosing the short stipe of the hairy seed. ♃ South. 1f. Leaves 1″. June.

7 P. incarnàta L. Glaucous; st. erect, slender, mostly simple; lvs. few, scattered, linear-subulate; spike oblong; wings lanceolate, cuspidate; claws of the petals united into a long, cleft tube; seed very hairy. ① N. J. to Fla. 1—2f. June.

8 P. Chapmánii T. & G. Very slender, simple, or nearly so; lvs. linear-subulate; spike loose, roundish-oblong, rather acute; wings obovate, slightly clawed; caruncle lateral on the thin-haired seed. ① South. 1f.

9 P. Nuttállii T. & G. St. erect, somewhat fastigiate; lvs. linear; spikes acute, roundish-oblong, dense; wings elliptical, attenuate at base; crest minute; caruncle notched, lateral on the thick seed-stipe. ① Mass., R. I., to La. 6—10′. August.

10 P. fastigiàta Nutt. Slender and much branched above; lvs. linear; spikes roundish, loose-flowered; wings ovate-oblong, distinctly clawed; caruncle broad, nearly embracing the small seed-stipe (immature). ① N. J. to Fla. 8—12′. July+.

11 P. sanguínea L. St. branching at top; lvs. linear and lance-linear; spikes oblong, obtuse, dense; wings oval or ovate, obtuse, subsessile; caruncle mostly simple, nearly as long as the hairy seed. ① Wet grounds. 10′. Leaves 1′. July+.

12 P. lùtea L. St. mostly simple; root leaves spatulate, obtuse, attenuate at base; cauline ones lanceolate, acute; rac. ovate-globous, obtuse, dense; fls. pedicellate; wings ovate, mucronate, keel with a minute crest. ② Sands, N. J. to Fla. 1f. June +.

13 P. nàna DC. Low, ascending; lvs. obovate and spatulate, mostly radical; heads ovate, becoming oblong, dense; wings lance-ovate, cuspidate-acuminate, twice longer than the slightly-crested keel. ② Pine woods, S. 4′. April, May.

14 P. ramòsa Ell. Erect, corymbously branched above; spikes loose, oblong, numerous, forming dense, level-topped cymes; radical lvs. few, spatulate, cauline oblong-linear; seed oval, caruncled. ② Swamps, Del. to Fla. 1f. June.

15 **P. cymòsa** Walt. Tall, corymbously branched at top; lvs. mostly radical, linear, pointed, crowded; stem lvs. very few, linear-subulate; racemes spike-like, forming a dense, fastigiate cyme; seed globular, naked. ② Swamps, S. 2—5f. June+.

16 **P. verticillàta** L. St. branched above, erect; lvs. linear, verticillate both on the stem and opposite branches; fls. crested; calycine wings roundish; seed oblong, smooth, caruncle hardly half as long. ① Dry hills. 6—8′. July+.

β. ***ambigua.*** Branches and upper lvs. alternate; spikes long; fls. scattered.

17 **P. Boykínii** T. & G. Sts. erect from an ascending base, simple; lvs. obovate and lanceolate; spike slender, pointed, dense; caruncle two-thirds the length of the very hairy seed. ♃ South. 12—18′. June—Aug.

18 **P. leptóstachys** Shuttl. Sts. filiform, strict; lvs. setaceous, in 4's or 5's, remote; spikes linear; seed smooth. ① Dry sands, Fla. 1f. Greenish.

19 **P. Hoókeri** T. & G. Sts. weak, 4-angled; lvs. in 4's, linear; spikes lance-ovate, pointed. Pine woods, Fla. to Tex. 1f. Flowers pale red.

20 **P. cruciàta** L. St. erect, winged at the angles, fastigiate; lvs. in 4's, linear-oblong, punctate; spikes ovate, dense, obtuse, subsessile; caruncle as long as the ovoid smooth seed. ① Wet grounds. 3—12′. July, Aug.

β. ***cuspidàta.*** Lvs. linear; heads squarrous with the wing-cusps. South.

21 **P. brevifòlia** Nutt. Slender, branched above; lvs. linear, short, remote, in 4's, or on the branches scattered; spike oblong, dense, obtuse, on long peduncles; wings ovate-lanceolate, acute; seed just as in No. 20. ① N. Y. to Fla. 1f. August.

22 **P.** SPECIŌSA. Shrub 6f; lvs. cuneate-oblong, alternate; fls. purple, in terminal rac.

23 **P.** MYRTIFÒLIA. Shrub 3—4f; lvs. oblong-obovate, altern.; fls. purple, in lateral rac.

24 **P.** OPPOSITIFÒLIA. Shrub 3f; lvs. opp., sessile, cordate, smooth; fls. roseate, large.

25 **P.** LATIFÒLIA. Shrub 3f; lvs. opposite, ovate, glaucous, downy beneath; fls. purple.

2. KRAMÈRIA, L. Ovary 1-celled, with 2 collateral ovules. Seed with no caruncle and no albumen. ♄ Racemes terminal.

K. lanceolàta Torr. Prostrate; lvs. lance-lin., acute, longer than ped.; fr. spiny. Fla

ORDER XLIII. LEGUMINOSÆ. LEGUMINOUS PLANTS.

Herbs, *shrubs*, or *trees*. *Leaves* alternate, usually compound, margins entire. *Stipules* 2, at the tumid base of the petiole. *Stipels* commonly 2. *Sepals* 5, more or less united, often unequal, the odd one always anterior. *Petals* 5, either papilionaceous or regular, perigynous, the odd one (when present) posterior. *Stamens* diadelphous, monadelphous, or distinct. *Anthers* versatile. *Ovaries* superior, single, and simple. *Style* and *stigma* simple. *Fruit* a legume, either continuous (1-celled), or (a loment) jointed into 1-seeded cells. *Seeds* solitary or several, destitute of albumen. Figs. 59, 60, 102, 157, 190–1, 203–4, 214, 233, 308, 354–6, 361–2, 397, 401–2, 480.

A vast and important order, containing 400 genera and 6,500 species, of which 350 are native in the United States.

I. MIMOSEÆ. Corolla regular, valvate in bud. Stamens exserted, hypogynous. Lvs. bipinnate...(§)
II. CÆSALPINEÆ. Corolla irregular, upper petal *interior* in bud. Stamens 5—10, perigynous...(§§)
III. PAPILIONACEÆ. Corolla papilionaceous, upper petal (the banner) larger and *exterior*...(*)
  * Stamens 10, all distinct to the base. Plants erect. (Tribe PODALYRIEÆ)...(1)
  * Stamens 10, monadelphous or diadelphous...(**)
    ** Leaves cirrhous, ending with a tendril. Stamens 9 and 1. Vines. (Tribe VICIEÆ)...(2)
    ** No tendrils. Pod a loment (§ 165), or rarely 1-seeded. Lvs. pinnate. (Tr. HEDYSAREÆ)...(3)
    ** No tendrils. Pod a legume (§ 165), rarely 1-seeded...(***)
      *** Erect (or if prostrate, with palmately 3-foliate leaves). (Tribe LOTEÆ)...(4)
      *** Twining or trailing vines, with pinnately compound leaves. (Tribe PHASEOLEÆ)...(5)

§ Pods flat, composed of 1 or more 1-seeded joints. Petals united. Stamens 4—10..MIMOSA. 1
§ Pods continuous,—*m* prickly, 4-sided and 4-valved. Petals united. Sta. 8—10..SCHRANKIA. 2
—*m* smooth,—*n* Petals distinct. Pod linear. Stamens 5 or 10..DESMANTHUS. 3
—*n* Petals distinct. Pod oblong. Stamens 10....NEPTUNIA. 4
—*n* Petals united. Trees, shrubs. Sta. ∞, monadel..ALBIZZIA. 5
—*n* Petals distinct, ylw. Shrubs. Stamens ∞ ..ACACIA. (5 *a*) 58
§§ Flowers perfect, red or yellow, showy. Trees or shrubs. Lvs. bipinnate..POINCIANA.(9 *a*) 59
§§ Flowers perfect, red or rose-colored. Trees with simple broad leaves...... CERCIS. 9
§§ Flowers perfect, yellow (in our species). Herbs with pinnate leaves.......CASSIA. 8
§§ Flowers imperfect, greenish.—Trees thornless, with bipinnate leaves.......GYMNOCLADUS. 6
—Trees thorny. Lvs. pinnate and bipinnate...GLEDITSCHIA. 7
1. PODALYREÆ.—*c* Trees. Leaves pinnate. Pod flat and thin........................CLADASTRIS. 10
—*c* Trees or shrubs. Lvs. ternate...CALLISTACHYS, 60, or pinnate in..SOPHORA (19 *a*) 61
—*c* Shrubs in the greenhouse, with simple, spiny-toothed leaves....CHORIZEMA. (10 *b*) 62
—*c* Herbs.—*p* Pod inflated, stipitate. Leaves 1–3-foliate..............BAPTISIA. 11
—*p* Pod flattened, sessile. Leaves 3-foliate.................THERMOPSIS. 12
2. VICIEÆ.—*d* Erect. Tendrils obsolete. Fls. white, with a black spot on each wing..FABA. 13
—*d* Climbing.—*q* Leaflets serrate. Pods 2-seeded.......................CICER. 14
—*q* Lfts. entire.—*r* Sty. grooved on the back. Sds. 3—9 glob..PISUM. 15
—*r* Sty. flattened on the bk. Sds. 3–9, flattish.LATHYRUS. 16
—*r* Sty. flattish. Seeds 1 or 2, *lens-shaped*....LENS. (17 *a*) 64
—*r* Style filiform. Seeds 2—7, roundish......VICIA. 17
3. HEDYSAREÆ.—*e* Fls. yellow.—*s* Leaves palmately 4-foliate. Stam. monadelphous..ZORNIA. 18
—*s* Leaves pinnate, 7–49-foliate. Stam. diadelphous..ÆSCHYNOMENE.19
—*s* Lvs. pinnately 3–7-foliate. Stam. monadelphous..CHAPMANIA. 20
—*s* Leaves pinnately 3-foliate. Pod slender at base...STYLOSANTHES.21
—*s* Leaves pinnately 4-foliate. Pod gibbous at base..ARACHIS. 22
e Fls. cyanic.—*u* Lvs. pinnate, 5–21-foliate.—*t* umbels pedunculate...CORONILLA. 23
—*t* rac. pedunculate.......HEDYSARUM. 24
—*u* Lvs. pin. 3-foliate.—*t* stipellate. Pod 3–7-jointed...DESMODIUM. 25
—*t* exstipellate. Pod 1-jointed..LESPEDEZA. 26
4. LOTEÆ—(including GENISTEÆ, Gen. 27—30, TRIFOLIEÆ, 31—34, and GALEGEÆ, 35—48).
f Leaves wanting ; if present, simple. Flowers yellow....... ....SPARTIUM. 27
f Leaves present, simple. Flowers yellow.—*v* Keel oblong, straight..............GENISTA. 28
—*v* Keel falcate, pointed..............CROTALARIA. 29
f Leaves palmately 5–15-foliate (rarely simple). (Genus 35, or)...................LUPINUS. 30
f Leaves palmately 3-foliate.—*w* Small tree with yellow hanging racemes. ....LABURNUM. 31
—*w* Shrubs. Fls. ylw., axil. Some of the lvs. simple..CYTISUS. (31 *a*) 65
—*w* Herbs with straight, small pods. Fls. capitate...TRIFOLIUM. 32
f Lvs. pinnately 3-foliate.—*x* Pods curved or spiral. Fls. in spikes, heads, &c......MEDICAGO. 33
—*x* Pods long and long-pointed. Flowers axillary..TRIGONELLA, (33 *a*) 66
—*x* Pods 1–2-seeded. Rac. (red, Gen. 50) white or yellow..MELILOTUS. 34
—*x* Pod 1-seeded.—*y* Fls. yellow. Lvs. resinous-dotted..(Genus 48
—*y* Fls. cyanic.—*z* Lvs. dark-dotted...PSORALEA. 35
—*z* Lvs. not dotted....(In Genus 26
f Lvs. pinnate, with no odd leaflet.—* 15 to 25 pairs. Tall. Fls. yellow. S......SESBANIA. 36
—* 1 to 6 pairs. Flowers purple. Cult........OROBUS. (13 *a*) 63
f Lvs. odd-pinnate,—*h* dotted with dark glands.—*k* Shrub. Fls. spicate..........AMORPHA. 37
—*k* Herbs 10-androus.. ....DALEA. 38
—*k* Herb 5-androus..............PETALOSTEMON.39
—*h* dotless.—*i* Herbs. Style glabrous. Pod partly 2-celled...ASTRAGALUS. 40
—*i* Herbs. Style hairy. Pod 1-celled...............TEPHROSIA. 41
—*i* Herbs. Style glabrous. Pod 1-celled.........INDIGOFERA. 42
—*i* Trees or shrubs. Flowers white or roseate.....ROBINIA. 43
—*i* Shrubs with yellow flowers.....................COLUTEA. 44
—*i* Shrubs with scarlet flowers.................CLIANTHUS.(44 *a*) 67
5. PHASEOLEÆ.—*g* Lvs. pinnate, 5–15-foliate.—*m* Vine shrubby. Keel falcate........WISTARIA. 45
—*m* Herbs. Keel (straight, Gen. 41) spiral..APIOS. 46
—*g* Leaves pinnately 3-(rarely 1)-foliate...(*n*)
n Flowers yellow. Legumes 5-seeded..... ....VIGNA. 47
n Flowers yellow. Legumes 1–2-seeded...................... ..RHYNCOSIA. 48
n Flowers cyanic...(*)

* Keel with stamens and style spirally twisted. Bushy or twining................PHASEOLUS. 49
* Keel straight or merely incurved...(*o*)
  o Shrubby at base. Flowers and seeds scarlet. Wings and keel very short. S..ERYTHRINA. 50
  o Herbs.—*x* Calyx ebracteolate. Style beardless. Petals suberect, pale.....AMPHICARPÆA. 51
    —*x* Calyx 2-bracteolate,—*y* 4-cleft. Style beardless. Fls. pale......GALACTIA. 52
      —*y* 4-toothed. Style bearded at top.........DOLICHOS. 53
      —*y* 5-cleft, long. Style bearded inside........CLITORIA. 54
      —*y* 5-cleft, short. Style bearded at top......CENTROSEMA. 55
      —*y* 5-lobed. Style beardless. Cultivated...KENNEDYA. 56
      —*y* 4-toothed. Style beardless. Cult......HARDENBERGIA. 57

1. MIMÒSA, L. SENSITIVE PLANT. (*Μίμος*, a buffoon: the leaves seem sporting with the hand that touches them.) Fls. ♀ ☿ ♂. ☿ Calyx valvate, 5-toothed. Cor. 0, or 5-toothed. Stam. 4—15. Legume separated into 1-seeded joints. ♂ Like the perfect, but without ovaries or fruit. ♃ ♄ Tropical. Leaves bipinnate.

1 **M. strigillòsa** T. & G. Nearly unarmed, prostrate, diffuse, strigous; stip. ovate; petioles and peduncles very long; pinnæ 4 to 6 pairs; lfts. 10 to 15 pairs, oblong-linear; heads oblong. ♃ Fla. to La. Flowers rose-color.

2 **M.** PÙDICA L. St. prickly, more or less hispid; lvs. digitate-pinnate, pinnæ 4, of many (30 or more) pairs of linear leaflets. Brazil. 1f. Leaflets 3″.

2. SCHRÁNKIA, Willd. SENSITIVE BRIER. (In honor of *Francis de Paula Schrank*, a German botanist.) Fls. ☿ ♂. Cal. minute, 5-toothed. Pet. united into a funnel-shaped, 5-cleft corolla. Stam. 8—10. Pod long and narrow, echinate, dry, 1-celled, 4-valved, many-seeded. ♃ Prickly. St. procumbent. Lvs. sensitive, bipinnate. Fls. in spherical hds., purplish.

S. uncinàta Willd. St. angled, grooved; pinnæ 6 to 8 pairs; lfts. numerous, minute, elliptic-oblong or linear; heads axillary, 1 to 2 together, on peduncles shorter than the leaves. S. States. 2—4f. Leaflets 2″. May—July.

3. DESMÁNTHUS, Willd. (*Δέσμη*, a bundle, *ἄνθος*, flower.) Cal. valvate, 5-toothed. Pet. 5, distinct. Stam. 5 or 10, distinct. Pod dry, flat, 2-valved, 4–6-seeded, smooth. ♃ ♄ With bipinnate lvs. and white fls. in axillary, pedunculate heads. Petioles with 1 or more glands.

D. brachýlobus Benth. Erect, smoothish; pinnæ 6 to 13 pairs; lfts. minute, 20 to 30 pairs; stam. 5; pods short 1′, 2–4-seeded. ♃ Ill. to La. 2f. June—Aug.

4. NEPTÙNEA, Lour. Anthers 10, crowned with a stipitate gland. Pod oblong, oblique, deflexed on the stipe, 2-valved. Otherwise as in Desmánthus.

N. lùtea Benth. Sts. ascending, strigous; pinnæ 4—5 pairs; lfts. linear-oblong, ciliate, crowded; ped. longer than the leaves; pod 5–8-seeded. ♃ Prairies, Fla. to La. The leaves similar to those of Mimosa. Flowers yellow. Pods stiped. (Acacia lutea C-B.)

5. ALBÍZZIA, Durazz. Calyx 4- or 5-toothed. Petals united into a funnel-form corolla. Stamens ∞, monadelphous at base, very long. Pod linear and flat, jointless, dry, 2-valved, many-seeded. ♄ ♄ Tropical, with the leaves twice pinnate. Flowers in dense heads or spikes, roseate or white, polygamous.

A. JULIBRÁSSIN. *Silk Tree.* Tree about 20f, glabrous, thornless; pinnæ 8—12 pairs, each with 20—30 pairs of *halved* leaflets (being one-sided), acute; heads pedunculate, forming a terminal panicle; corollas white, with the innumerable long silky stamens purplish; pods some contracted between the seeds. Very ornamental, hardy South, sparingly naturalized in the Gulf States.

6. GYMNÓCLADUS, Lam. Coffee Tree. (*Γυμνός*, naked, *κλάδος*, a shoot; for its coarse, naked shoots in winter.) Fls. ♀ ♂. Cal. tubular, 5-cleft, equal. Pet. 5, inserted into the summit of the tube. ♂ Stam. 10, distinct. ♀ Style 1. Leg. 1-celled, oblong, very large, pulpy within. ♄ Unarmed, with unequally bipinnate lvs. Lfts. ovate, acuminate. Fig. 480.

G. Canadénsis Lam.—Woods, N. Y. to Ill. and Tenn. 50f. Rac. greenish; seeds round, polished, brown, very hard, ½′ diam. May—July.

7. GLEDÍTSCHIA, L. Honey Locust. (To *John G. Gleditsch*, a botanical writer, Leipzig.) Fls. ♀ ☿ ♂. Sep. equal, 3—5, united at base. Pet. 3—5. Stam. 3—5, distinct, opposite the sepals. Style short. Legume continuous, compressed, often intercepted between the seeds by a sweet pulp. ♄ With branched spines. Lvs. abruptly pinnate and bipinnate, often in the same specimen. Fls. small, green, racemous. Figs. 362, 401.

1 **G. triacánthus** L. Branches armed with stout, triple, or multiplex spines; lfts. alternate, oblong-lanceolate, obtuse; leg. linear-oblong, compressed, many-seeded. Pa. to Mo. and La. 40—70f. Wood very heavy. Pods 8—18′. May—July.

2 **G. monospérma** Walt. *Water Locust.* Spines few, mostly simple; lfts. ovate-oblong; pod broadly oval, without pulp, 1-seeded. Swamps, S. 30f.

8. CÁSSIA, L. Senna. (Hebrew *Katzioth.*) Sep. 5, scarcely united at base, nearly equal. Pet. 5, unequal, but not papilionaceous. Stam. distinct, 10, or by abortion fewer, anth. opening by terminal pores, the three upper often sterile. Pod many-seeded, 1-celled or many-celled transversely. ♄ ♄ or herbs. Lvs. abruptly pinnate. Fls. mostly yellow. Fig. 357.

§ Stam. 5 or 10, all perfect. Sep. acute. Lfts. small. Stip. persistent.......Nos. 1, 2
§ Stam. 10, the 3 upper abortive. Sep. obtuse. Lfts. large. Stip. deciduous..(*a*)
  a Gland on the petiole at or near the base.................................Nos. 3, 4
  a Gland on the rachis between the two lowest leaflets.................Nos. 5, 6

1 **C. Chamæcrísta** L. *Sensitive Pea.* Lfts. 8—12 pairs, oblong-linear, obtuse, mucronate; fls. large, pedicellate, 2 or 4 in each fascicle; anth. 10, unequal, all fertile. ① Dry soils. 12—18′. Flowers large, 2 petals spotted. August.

2 **C. níctitans** L. *Wild Sensitive Plant.* Lfts. 6—15 pairs, oblong-linear, obtuse, mucronate, sessile; fls. small, 2 or 3 in each subsessile fascicle; stam. 5, subequal. ① Sandy soils. 1f. Flowers small (3″), pale yellow. July.

3 **C. Marilándica** L. *American Senna.* Lfts. 6—9 pairs, oblong-lanceolate, mucronate, an obovoid gland near the base of the common petiole; fls. racemed; pod curved, 12–20-seeded. ♃ Stony places. 4—5f. Flowers showy. August.

4 **C. occidentàlis** L. Lfts. 3—6 pairs, ovate or lance-ovate, sharply acuminate; fls. in short racemes; pod nearly straight, 25–40-seeded. ① Va. to Ga. 5—6f. July. §

5 **C. obtusifòlia** L. Lfts. about 6, obovate, obtuse; pod long (6′) and narrow, recurved, 20–40-seeded; seeds longitudinal. ① Dry soil, S. 1—4f. July, Aug.

6 **C. melanocárpa** Vogel. Shrubby; lfts. 2—3 pairs, narrowly lanceolate, acute, coriaceous; rac. as long as the leaves. Ga. §

9. CÉRCIS, L. Judas-tree. Red-bud. Calyx 5-toothed. Petals scarcely papilionaceous, distinct, wings longer than the banner and smaller than the keel petals. Stamens 10, distinct. Pod compressed. Seeds obovate. ♄ Leaves simple, appearing after the roseate flowers. Fig. 308.

1 **C.** Siliquástrum. Lvs. round-reniform; flowers more open than in No. 2. Eur. 20f.

2 **C. Canadénsis** L. Lvs. broadly ovate-cordate, acuminate, villous on the veins beneath. Mid. and W. States. 20—30f. Flowers covering the branchlets. April.

10. CLADÁSTRIS, Raf. Yellow-wood. Cal. 5-toothed, teeth short, obtuse. Pet. of nearly equal length, those of the keel distinct and straight like the wings. Vex. large, roundish, reflexed. Stam. 10, distinct. Fil. glabrous, incurved. Leg. flat and thin, short-stiped, 5 or 6-seeded. ♄ With yellow wood, pinnate leaves, and pendulous clusters of white flowers.

C. tinctòria Raf.—Hills, Ky. and Tenn. 20—40f. Lfts. 7—11, oval, pointed, 3′; rac. 6—10′, resembling Robinia. April, May.

11. BAPTÍSIA, Vent. Wild Indigo. (*Βάπτω*, to dye; a use to which some species are applied.) Cal. 4–5-cleft half way, persistent. Pet. of about equal length, those of the keel nearly distinct and straight. Vex. orbicular, emarginate. Stam. 10, distinct, deciduous. Pod inflated, stipitate, many (or by abortion few)-seeded. ♃ Lvs. palmately 3-fol. or simple.

§ Leaves simple. Flowers yellow...Nos. 1, 2
§ Leaves 3-foliate.—Flowers blue, in few elongated racemes...................No. 3
—Flowers white, in few elongated racemes..(*a*)
—Flowers yellow, solitary or in short racemes..(*b*)
a Stipules leaf-like, longer than the petioles. Hairy. Cream-white....Nos. 4, 5
a Stipules much shorter, or not longer than the petioles. Glabrous....Nos. 6, 7
b Pedicels not longer than the calyx. Drying dark.............Nos. 8—10
b Pedicels much longer than the calyx. Drying bright..........Nos. 11—13

1 **B. perfoliàta** R. Br. Glabrous and glaucous; lvs. large, oval-orbicular, perfoliate; fls. solitary, axillary. Pine woods, S. Car. Ga. 1—2f. Pod inflated. May—July.

2 **B. simplicifòlia** Croom. Lvs. broadly ovate, obtuse, sessile; rac. terminal, elongated, many-flowered. Quincy, Fla. 2—3f. Pod ovate. 6″. June.

3 **B. austràlis** R. Br. Petioles short; lfts. obovate or oblong, obtuse; stip. lanceolate; rac. long, erect; pod oblong-oval. Ohio River and S. 2—3f. Flowers large and showy, indigo blue. June—Aug.

4 **B. leucophæa** Nutt. Lfts. oblanceolate, varying to obovate; stip. triangular-ovate; rac. nodding, the many flowers turned to the upper side on their long pedicels; pod ovoid, inflated. Prairies, W. and S. 2—3f. Flowers large. April.

5 **B. villòsa** Ell. Lfts. lance-oblong, or oblanceolate; stip. lance-linear, persistent; rac. long, declining; bracts minute, deciduous; ped. not secund; leg. oblong. N. Car. to Ga.: rare. 2—3f. Plant of rough aspect, as well as No. 4. June, July.

6 **B. leucántha** T. & G. Lvs. petiolate; lfts. cuneiform-obovate, obtuse; stip. lance-linear, about as long as petioles; rac. elongated, erect; bracts caducous; pod inflated, stipitate. Prairies, &c. W. and S. 2—3f. Flowers large. May—July.

7 **B. alba** R. Br. Fastigiate-branched above; petioles slender; lfts. elliptic-oblanceolate, acute at base; stip. and bracts minute, caducous; rac. erect or nodding, on a long peduncle. In rich soils, Va. to Fla. 2—3f. March, April.

8 **B. lanceolàta** Ell. Much branched, bushy; lvs. subsessile; lfts. narrowly elliptic to oblanceolate, obtuse, petiolulate; fls. axillary, subsolitary, short-pedicelled; pod ovate-globous. Pine woods, S. 1½f. Flowers large, dull yellow. April, May.

β. ***stricta.*** Erect, strict; lfts. obovate, very obtuse; rac. few-flwd., termin. La. Fla.

9 **B. tinctòria** R. Br. Glabrous, branching; lvs. subsessile; lfts. small, roundish-obovate, acute at base, very obtuse at apex; stip. setaceous, caducous; rac. loose, terminal; pod subglobous. Dry woods. 2f, bushy. Pod size of a pea. July—Sept.

10 **B. microphýlla** N. Smooth, bushy; lvs. small, 2-3-foliate below, simple, sessile above; stip. and bracts large, persistent; fls. small, axillary, and in terminal racemes. S. Car. to Fla. 2—3f. (B. stipulacea Ravenel.)

11 **B. Lecóntii** T. & G. Pubescent; lvs. short-petioled; lfts. obovate-oblong; pedicels with 2 bractlets; bracts persistent; pod short-stiped; branches, stipules, and racemes as in No. 9. Ga. Fla. 2f. May.

12 **B. Serènae** Curtis. Smooth, diffuse; lfts. oblong-obovate, cuneate; fls. in terminal racemes, the central longest. S. Car. 1—2f. Pod oblong.

13 **B. megacárpa** Chapm. Glabrous, slender; lvs. petioled; lfts. oval; rac. short and short-stalked; stip. and bracts minute, caducous; fls. nodding; pod large, globular, and much inflated. Ga. Fla.: rare. 2—3f. Pods 1½′.

12. **THERMÓPSIS,** R. Br. (Named for its resemblance to the Egyptian Lupine—*L. Thermis.*) Vex. roundish, sides reflexed. Sta. persistent. Pod subsessile, linear-oblong, many-seeded. ♃ Rhizome creeping, stems with sheathing bracts at base. Leaves 3-foliate. Flowers large, yellow.

1 **T. mollis** M. A. Curtis. Pubescent, diffusely branched; lfts. obovate-oblong; stip. leafy, as long as the petioles; ped. shorter than calyx. Woods, N. Car. 2f. April.

2 **T. fraxinifòlia** Curt. Smoothish, slender, branching; petioles longer than the stipules; lfts. wedge-oblong; ped. as long as the flower. Mts. Tenn. Car. 2f. May.

3 **T. Caroliniàna** Curt. St. stout, simple; petioles as long as the ovate clasping stipules; lfts. obl.-obov.; fls. on short ped. with decid. bracts. Mts. N. Car. 4f. June.

13. **FABA,** Mœnch. COFFEE BEAN. Fls. as in Vicia. Seeds oblong, with a long scar (hilum) on the narrower end, and leathery, tumid legumes. ① Lvs. equally pinnate, with the tendril obsolete (in the following species). Peduncle shorter than the flowers.

F. VULGÀRIS Mœnch. St. rigidly erect, with very short axillary racemes; lfts. 2—4, oval, entire; stipules semisagittate Gardens. From Egypt. 2—3f. Glaucous.

14. **CICER** ARIETÌNUM, the CHICK PEA, rarely cultivated, may be known by its serrated leaflets, a character quite strange in this Order.

15. **PISUM,** L. PEA. (Celtic *pis*, Lat. *pisum*, Eng. *pea*, Fr. *pois.*) Style dilated above, grooved on the back, villous and stigmatic on the inner side. Otherwise as in Lathyrus. ① Figs. 59, 60, 190.

P. SATÌVUM L. Lfts. ovate, entire, usually 4; stip. ovate, semicordate at base, crenate; ped. several-flowered. Nativity unknown. Many varieties.

16. **LÁTHYRUS,** L. Calyx campanulate, the two upper sepals shortest. Stam. diadelphous (9 and 1). Style flat, dilated above, ascending, bent at a right angle with the ovary, pubescent or villous along the inner side next the free stamen. Pod oblong, several-seeded. ♄ ♄ Leaves abruptly pinnate, of 1 to several pairs of leaflets. Petioles produced into tendrils. Pods axillary. Fig. 397.

* Native.—*a* Leaflets a single pair. Southern .... No. 1
—*a* Leaflets commonly 3 pairs. Perennial ....Nos. 2, 3, 4
—*a* Leaflets commonly 5 pairs. Perennial ....Nos. 5, 6
* Exotic.—*b* Leaflets a single pair ....Nos. 7—9
—*b* Leaflets 3 to 6 pairs. (Species of Orobus) ....Nos. 10—12

1 **L. pusíllus** Ell. St. winged; lfts. 2, linear-lanceolate, acute at each end; stip. conspicuous, lance-falcate, half-sagittate; ped. long. S. Car. to La. Purple. May.

2 **L. ochroleùcus** Hook. St. slender; lfts. broadly ovate; stip. semicordate, large; ped. 7-10-flowered, shorter than the leaves; fls. cream-white. Shades, N. 3f. June.

3 **L. palústris** L. St. winged; stip. semisagittate, mucronate; lfts. 2 or 3 pairs, lance-linear or oblong, mucronate; ped. 3-5-flowered, equalling the leaves. Wet thickets, N. Eng. to Oreg. 1—2f. Blue-purple. June—July.

4 **L. myrtifòlius** Muhl. St. slender, 4-angled; lfts. elliptic-oblong, obtuse; stip. ovate, entire; ped. longer than lvs., 5-flwd. N. E. to Va. and Ind. 2-4f. Pale purp. Jl.

5 **L. venòsus** Muhl. St. 4-angled; stip. semisagittate, lanceolate, very small; ped. 8-16-flowered, shorter than the leaves; lfts. 4—7 pairs, somewhat alternate, obtusish, mucronate. Shady banks. 2—3f. Flowers large, purple. June, July.

6 **L. marítimus** Bw. *Beach Pea.* St. 4-angled, compressed; petioles flat above; stip. cordate-hastate, nearly as large as the 8—12 ovate leaflets; ped. many-flowered. Sandy shores, N. Y. to Oreg. 1—2f. Leaves pale green. Flowers blue. May, June.

7 **L.** LATIFÒLIUS. *Everlasting Pea.* Ped. many-flowered; lfts. 2, lanceolate, internodes membranous-winged. ♃ Eur. 6f. Flowers large, pink. July, Aug.

8 **L.** ODORÀTUS. *Sweet Pea.* Ped. 2-flowered; lfts. 2, ovate-oblong; leg. hirsute. ① Sicily. Flowers very large, fragrant, red-white. June.

9 **L.** SATÌVUS. *Chick Pea.* Ped. 1-flowered; lfts. 2—4; leg. ovate, compressed, with 2 winged margins at the back. ① S. Eur. An unhealthy food.

10 **L.** VERNUS. Lfts. 6, ovate, acuminate; fls. red-purple-blue. Europe. 1f. April.

11 **L.** NIGER. Lfts. 12, ovate-oblong; fls. dark purple. Europe. 3f. July.

12 **L.** ATROPURPÙREA. Lfts. linear, 3 pairs, acute; fls. dark purple. Algiers. 1f. May.

17. VÍCIA, L. VETCH. (Celtic *gwig*, whence Gr. *βικιον*, Lat. *vicia*, Fr. *vesce*, and Eng. *vetch.*) Style filiform, bent at right angles with the ovary, villous beneath the stigma on the outside (next the keel). Otherwise nearly as in Lathyrus.

* Peduncles 1-2-flowered, shorter (in flower) than the leaves....................Nos. 1—3
* Peduncles 3-20-flowered.—*a* Leaflets 3—6, very narrow.......................No. 4
—*a* Leaflets 8—20.—*b* Stipules long-toothed..............No. 5
—*b* Stipules entire.................Nos. 6—8

1 **V. satìva** L. *Vetch. Tares.* Fls. solitary or in pairs, subsessile; lfts. 10—12, oblong-obovate, often linear, retuse, mucronate; pod linear, erect, 4-8-seeded. ① Fields. 2—3f. Fls. 6″, pale purple. June. § Eur.

2 **V. tetraspérma** Loisel. Ped. 1-2-flowered, in fl. shorter (in fr. longer) than the lvs.; pod 4-seeded; lfts. 4—6, small, linear, obtuse. Fields, Can. to Penn. St. very slender, 1—2f. Fls. bluish-white. Pod 5″. July.

3 **V. micrántha** N. Lfts. 4—6, linear, acute, obtuse or retuse; fls. mostly solitary, minute, pale; pod 1′, sabre-shaped, erect, 6-10-seeded; seeds black. S. 2—3f.

4 **V. acutifòlia** Ell. Leaflets 3—6, linear, acute; stip. lance-linear; tendrils mostly simple; rac. 3-9-flowered, longer than the leaves. Ga. Fla. 2—4f. Whitish.

5 **V. Americàna** Muhl. Ped. 4-8-flowered, shorter than the lvs.; stip. semisagittate, deeply dentate; lfts. 10—14, elliptic-lanceolate, obtuse; pod oblong-linear, compressed, reticulated. N. Y. westward. 1—3f. Blue-purple. May.

6 **V. Caroliniàna** Walt. Pedicel 6-12-flowered, rather shorter than the leaves; fls. loose; calyx teeth very short; stip. lance-linear; lfts. 8-12, linear-oblong or linear, smoothish; pod oblong. Woods and banks. 4—6f. Pale purple. May.

7 **V. Crácca** L. *Tufted Vetch.* Fls. imbricated, 12—20 or more in the raceme; lfts. 12—24, oblong, puberulent; stip. semisagittate, linear-subulate, entire. Thickets. 2—3f. Flowers blue-purple, 4″. July.

8 **V. hirsùta** Koch. Hairy; lfts. 8—20, linear, truncate, mucronate; ped. 3-6-flwd., shorter than leaves; leg. hirsute, 2-seeded. Fields. 1—3f. June. §

18. ZÓRNIA, Gmel. (For *John Zorne*, M. D., of Bavaria.) Calyx bilabiate, upper lip obtuse, emarginate, lower 3-cleft. Vex. orbicular, with the sides revolute. Sta. monadelphous, the alternate anthers different. Pod compressed, of 2—5 roundish joints. ♃ Lvs. palmately 2–4-foliate with sagittate stip., which are enlarged above and supply the place of bracts.

Z. tetraphýlla Mx. Lfts. 4; stip. or bracts oval, acute: pod aculeate, about 3-jointed. ♃ N. Car. to Fla. and Tex. 1—2f. Deep yellow. Pods adhesive. June—Aug.

19. ÆSCHYNÓMENE, L. (*Αἰσχύνομαι,* to be modest; alluding to its sensitive property.) Calyx bilabiate, bibracteolate; upper lip bifid, lower trifid. Vex. roundish. Stamens diadelphous, 5 in each set. Pod exserted, composed of several truncated, separable, 1-seeded joints.—Lvs. odd-pinnate. Stip. semisagittate. Rac. axillary (yellow). August.

1 **Æ. híspida** Willd. Erect, scabrous; lfts. very smooth, 27—37, oblong-linear, obtuse; rac. 3-5-flowered; pod 6–9-jointed. ① Marshes, Pa. and S. 2—3f.

2 **Æ. viscídula** Mx. Slender, procumbent, viscidly pubescent; lfts. 7—11, obovate; ped. filiform, 1 or 2-flowered; pod 2 or 3-jointed. ① Sandy fields, S.

20. CHAPMÁNIA, T. & G. (To *A. W. Chapman,* M. D., author of "Flora of the Southern States.") Fls. nearly as in Stylosanthes. Cor. inserted on the throat of the calyx. Keel 2-cleft at apex. Anth. alike, oblong. Leg. hispid, 1–2-jointed.—A viscid-hirsute branching herb. Leaves pinnately 3–7-foliate. Fls. small, yellow, in terminal racemes.

C. Floridàna T. & G.—E. Fla. 2—3f. Lfts. oblong.

21. STYLOSÁNTHES, Swartz. (*Στῦλος,* a style, *ἄνθος.*) Fls. of two kinds. ♂ Calyx bibracteolate at base, the tube very long and slender, with the corolla inserted on its throat. Vex. very broad. Sta. 10, monadelphous. Ov. sterile, with a very long style. ♀ Cal. and corolla 0. Ov. between 2 bracteoles. Leg. 1–2-jointed, uncinate with the short, persistent style.—Lvs. pinnately trifoliate.

S. elàtior Swartz. *Pencil Flower.* St. pubescent on one side; lfts. lanceolate, smooth, acute; spikes 3-4-flowered; loment 1-seeded (lower joint abortive). ♃ Dry, gravelly woods, Long Isl. to Fla. 1f. Fls. yellow. July, August.

22. ÁRACHIS, Willd. PEANUT. (Lat. *aracos,* used by Pliny to designate some subterranean plant.) Calyx bilabiate. Cor. resupinate. St. monadelphous. Pod gibbous at base, coriaceous, veiny, turgid, and indehiscent, the joints not separating.—S. American herbs, with equally pinnate leaves and yellow flowers.

A. hypogæa Willd. Leaflets 2 pairs, oval or roundish, cuneate at base; stip. entire, lance-subulate, as long as the leaflets; fruit subterranean. Cult. South.

23. CORONÍLLA, L. (Lat. *corona,* a crown; from the inflorescence.) Calyx bilabiate. Petals unguiculate. Loment somewhat terete, jointed. Seeds mostly cylindrical. ♄ ♃ Lvs. unequally pinnate. Fls. in simple, pedunculate umbels, rose-colored.

1 **C.** ÉMERUS. *Scorpion Senna.* St. woody, angular; ped. about 3-flowered; claws of the petals thrice longer than the calyx. France. 3f. May.

2 **C.** VÀRIA. Herbaceous; lfts. 11—19, oblong; ped. 10-15-flwd. Eur. 2—4f. Jl.—Sept.

24. HEDÝSARUM. L. (*Ἡδύς,* sweet, *ἄρωμα,* smell.) Calyx cleft into 5 linear-subulate, subequal segments. Keel obliquely truncate, longer than the wings. Sta. diadelphous (9 and 1), and, with the style, abruptly bent near the summit. Pod (loment) of several 1-seeded joints connected by their middle. ♃ Leaves unequally pinnate.

H. boreàle N. Erect; lfts. 13—21, oblong; stip. united, sheathing; flowers deflexed, spiked on the long peduncle, violet-purple; pod of 1—4 lens-shaped, veiny joints. Rocks, Willoughby Lake, Vt. and N. 1—2f. Flowers large. June, July.

25. DESMÒDIUM, DC. BUSH TREFOIL. Calyx more or less bilabiate. Vex. roundish, keel obtuse. Sta. diadelphous (9 and 1) sometimes monadelphous. Pod (loment) compressed, jointed, constricted most on the lower (dorsal) suture, the joints 1-seeded, separable, mostly aculeate and adhesive. ♃ ♄ Leaves pinnately trifoliate. Flowers in racemes or often large, loose panicles, purplish, in Summer. Figs. 191, 355.

§ Legumes distinctly stiped, the stipes about as long as the joints...(*a*)
  a Stems prostrate, creeping. Leaflets round or oval...............Nos. 1—2‡
  a Stems erect. Leaflets broadly ovate, or (in No. 6) narrowly...(*b*)
    b Calyx teeth shorter than the tube ....Nos. 3—5
    b Calyx teeth longer than the tube,—upper one notched...Nos. 6—8
      —upper one entire.........No. 9
§ Legumes subsessile, the stipes, if any, not exceeding the calyx...(*c*)
  c Bracts large, covering the flower buds, caducous...(*d*)
  c Bracts inconspicuous, smaller than the flower buds...(*e*)
    d Stipules large (6—9″ long), ovate-lanceolate...........Nos. 10, 11
    d Stipules quite small, subulate ....Nos. 12, 13
      e Leaflets large (2—3′ by 1—2′), oblong-ovate...Nos. 14, 15
      e Leaflets small, orbicular or oval..............Nos. 16—18
      e Leaflets long, linear...No. 19. Lfts. oblong.†...No. 20

1 **D. rotundifòlium** DC. Plant prostrate, downy; leaflets suborbicular; bracts and stipules broadly ovate, acuminate; racemes few-flowered; loment constricted on both margins nearly alike. Rocky woods. 2—3f. Purplish. August.

2 **D. ochroleùcum** Curt. Plant decumbent, smoothish; lfts. ovate, rarely single; stip. ovate, pointed; raceme long, fls. white; loment twisted. Woods, Md. & S. (Porter).

3 **D. nudiflòrum** DC. Lfts. roundish ovate, bluntly acuminate, slightly glaucous beneath; scape radical, panicled, smooth; joints of the loment obtusely triangular. Woods, com. St. 1f, scape 2—3f, with many small purple flowers.

4 **D. acuminàtum** DC. Plant erect, simple, pubescent, leafy only at top; leaflets ovate, long-acuminate, the odd one round-rhomboidal; pan. terminal, on a very long peduncle. Woods, com. 8—12′, the panicle 2—3f. Fls. small, flesh-color. Pod 3-jointed.

5 **D. pauciflòrum** DC. St. assurgent, leafy all the way, retrorsely hairy; lfts. thin, obliquely ovate, acutish, terminal one rhomboidal; rac. terminal, the flowers few, in pairs; petals all distinct, spreading. Woods, N. Y. to Ill. and La. 1f. Whitish.

6 **D. paniculàtum** DC. Erect, slender, nearly glabrous; lfts. oblong-lanceolate, obtuse; stip. subulate, deciduous; fls. on slender pedicels in panicled racemes; loment of about 3 triangular joints. Woods, common, 2—3f. Purple.

7 **D. viridiflòrum** Beck. Densely pubescent; lfts. ovate, scabrous above, whitened beneath; stip. lance-ovate, acuminate; pan. naked, very long; pod of 3 or 4 triangular joints. Alluvion, N. Y. and S. 3—4f, rigid. Violet, fading to green.

8 **D. lævigàtum** DC. Glabrous, or nearly so; lfts. ovate; panicle subsimple, pedicels slender, in pairs. Woods, N. J., and S. 2—3f. Purple.

β. ***monophyllum*.** Dwarf, simple; lower lvs. 1-foliate. Uxbridge, Ms. 1f. (Ricard.)

9 **D. glabéllum** DC. St. smoothish; lfts. ovate, small, rough-pubescent on both sides; pod of 3 or 4 triangular, minutely hispid joints. Shades, Car.

10 **D. cuspidàtum** T. & G. Smooth; lfts. oblong-oval, or ovate, sharply acuminate; bracts deciduous, ovate, acuminate; joints of the loment suboval. Woods. 3—5f. Stipules and bracts 9″. Flowers 8″, purple.

11 **D. canéscens** DC. St. striate, scabrous; lfts. ovate, rather obtuse, scabrous on the upper surface, soft-villous beneath; pan. densely canescent, naked; joints of the loment 4, obliquely oval, hispid. Woods. 3f.

12 **D. Canadénse** DC. St. pubescent; lfts. oblong-lanceolate, obtuse, nearly smooth; stip. filiform; bracts ovate, long-acuminate; joints of the loment obtusely triangular, hispid. Woods, Can. to Pa. and W. 3f. Flowers 8″, purple.

13 **D. sessilifòlium** T. & G. St. tomentous-pubescent; lvs. sessile; lfts. linear or linear-oblong, obtuse at each end, scabrous above, softly tomentous beneath; stip. subulate; pod of 2—3 semiorbicular joints. Woods, W. 2—3f. Fls. small, crowded.

14 **D. Dillènii** Darl. Branching, hairy; lfts. oblong, villous beneath; stip. subulate; rac. panicled; joints of the loment 3, rhomboidal, reticulate, a little hairy, connected by a narrow neck. Moist soils, N. and W. 2—3f. Purple.

15 **D. rígidum** DC. Scabrous, pubescent; lfts. ovate-oblong, obtuse; petioles short, hairy; stip. ovate-acuminate, ciliate, caducous; leg. with 2—4 obliquely obovate joints. Hills and woods, Mass. to La. 2—3f. (D. Floridanum Chapm.)

16 **D. ciliàre** DC. Erect, slender, scabrous-pubescent; lvs. crowded, on short, hairy petioles; lfts. small, ovate, ciliate on the margin; joints of the short-stiped loment 2 or 3. Woods. 2f. Purple.

17 **D. Marilándicum** Boott. Erect, slender, nearly smooth; lfts. ovate, obtuse, subcordate at base, the lateral ones as long as the petioles; loment stipe as long as the calyx, joints 1 or 2. Woods. 2—3f. Violet.

18 **D. lineàtum** DC. Slender, reclining; st. finely striate with colored lines; lfts. small, roundish oval, smoothish, green both sides; pod quite sessile in the calyx, joints about 2. Dry woods. 2 or 3f.

19 **D. stríctum** DC. Slender, nearly glabrous; lvs. petiolate; lfts. linear, elongated; pan. few-flowered; pod hispid, incurved, of 1—3 lunately triangular joints, with a filiform isthmus. Pine woods, N. J. and S. 3f.

20 **D.** GYRANS. *Moving-plant.* Lateral lfts. very small; pods pendulous. From Bengal. Wonderful for the leaves, which in warm weather are always in motion.

26. **LESPEDÈZA,** Mx. BUSH CLOVER. Calyx 5-parted, bibracteolate, segments nearly equal. Keel of the corolla very obtuse, on slender claws. Pod (loment) lenticular, compressed, small, unarmed, indehiscent, 1-seeded. ♃ Leaves palmately trifoliate, reticulately veined. Summer.

§ Fls. all complete. Calyx villous, long. Cor. whitish with a purple spot....Nos. 1, 2
§ Fls. partly apetalous. Calyx short. Corolla violet.—*a* Stems upright......Nos. 3, 4
—*a* Stems prostrate........No. 5

1 **L. capitàta** Mx. *Bush Clover.* Lfts. elliptical to linear, silky beneath; stip. subulate; fascicles of flowers ovate, subcapitate, shorter than the leaves, axillary; loments hairy, shorter than the villous calyx. Dry soils, Can. to Car. 2—4f.

2 **L. hirta** Ell. Stem villous; lfts. roundish oval, pubescent beneath; rac. capitate, axillary, oblong, longer than the leaves; corolla and pod about as long as the calyx. Dry woods. 2—4f. Flowers reddish-white.

3 **L. Steùvi** Nutt. Branched and bushy, tomentous or pubescent; lfts. oval-obovate or roundish, longer than the petiole; rac. axillary, capitate or loose; pod villous-pubescent. Dry soils, Mass. to Ga. 2f. Variable.

4 **L. violàcea** Pers. Erect or diffuse, sparingly pubescent; lfts. oval, varying to oblong and linear, obtuse, mucronate, as long as the petioles; rac. axillary, few-flowered, the apetalous ones generally below. Dry woods. Leaflets 1′.

β. ***sessiliflòra.*** Flowers many, in clusters shorter than the leaves.
γ. ***reticulàta.*** Leaflets linear, rigid; flowers in short fascicles. Erect.
δ. ***divérgens.*** Leaflets ovate; upper peduncle longer than the leaves.

5 **L. procúmbens** Mx. St. prostrate, diffuse, tomentous-pubescent; lfts. oval or obovate-elliptical, smooth above, on very short petioles; ped. filiform, few-flowered; pod roundish. Dry soils. Leaflets 5—9″. Ped. 2—5′.
β. ***repens.*** Nearly smooth and very slender; leaflets oval or elliptical.
γ. ***Feayàna.*** Decumbent; leaflets obovate; upper ped. apetalous. South.

27. SPÁRTIUM, L. COMMON BROOM. (Σπάρτον, a rope; formerly made of the Broom.) Calyx spathe-like, split behind, teeth very short. Keel incurved, acuminate, longer than the wings. Otherwise like Genista.

S. SCOPÀRIUM.—Shrub native of Spain, 6f, with rush-like erect branches often leafless. Leaves simple (if any), oblong. Flowers showy, yellow or white.

28. GENÍSTA, L. DYER'S BROOM. WOAD-WAXEN. (Celtic *gen*, Fr. *genet;* a small shrub.) Calyx with the upper lip 2-parted and the lower 3-toothed. Vex. oblong. Keel oblong, scarcely including the stamens and style. Stigma involute. Stamens monadelphous. ♄ With simple leaves and yellow flowers.

G. tinctòria L. Branches round, striate, unarmed, erect; lvs. lanceolate, smooth; pod smooth. Dry hills, Mass. N. Y. 1f. August. § Europe.

29. CROTALÀRIA, L. RATTLE-POD. (Κρόταλον, a rattle; from the rattling of the loose seeds in the horny pod.) Calyx 5-cleft, somewhat bilabiate. Vex. cordate, large. Keel acuminate. Stam. 10, monadelphous. Filamentous sheath cleft on the upper side. Pod pedicellate, turgid.—Herbs or shrubs. Lvs. simple or palmately compound. Flowers yellow.

1 **C. sagittàlis** L. Annual, erect, branching, hairy; lvs. lance-oval to lance-linear; stip. acuminate, decurrent; rac. 3-flowered, opposite to the leaves; cor. shorter than the calyx. Sandy fields. 6—12′. Cor. small. July.

2 **C. ovàlis** Ph. Perennial, hairy, diffuse; lvs. oval and elliptic; stip. small or minute, partly decurrent; pedicels long, 3-6-flowered; corolla longer than the calyx. Sandy woods, S. 4—12′. Flowers showy. April, May.

3 **C. Púrshii** DC. Perennial; slender, assurgent, nearly smooth; lvs. oblong-linear or linear, subsessile; stip. narrowly decurrent through the whole internode; pedicels 5-7-flowered; corolla as long as the calyx. Damp shades, S. 1—1½f.

30. LUPÌNUS, Tourn. LUPINE. (Lat. *lupus*, wolfish as a weed?) Cal. deeply bilabiate; upper lip 2-cleft, lower entire or 3-toothed. Wings united at the summit. Keel falcate, acuminate. Stam. monadelphous, the sheath entire. Anth. alternately oblong and globous. Pod compressed. ①♃♄ Leaves palmately 5–15-foliate, rarely unifoliate. Raceme terminal.

1 **L. villòsus** Willd. Unifoliate, densely silky-tomentous; sts. decumbent-assurgent; lvs. large, elliptic-oblong, long-petioled; rac. terminal, long, dense-flwd. Pine woods, S. 1—2f. Flowers roseate, with a purple spot. Pods very woolly. April—June.

2 **L. diffùsus** N. Diffusely branched from the base; lvs. oval-oblong, obtuse, soft-silky, on short petioles; pods very silky. Sands, S. Blue-purple. April.

3 **L. perénnis** L. Minutely pubescent, 5-7-foliate; lfts. oblanceolate, mucronate; fls. alternate; calyx without appendages, upper lip emarginate, lower entire. Sandy hills. 1f. Flowers blue, varying to white. May, June. Cultivated.

4 **L.** polyphýllus. Lfts. 11—15, lanceolate; calyx lips subentire. Oreg. 3f. Purp.-wh.
5 **L.** Nootkaténsis. Villous; lfts. 5—9, oblong; cal. lips subentire. N.W. Coast. 2f. Pur.
6 **L.** Hartwégii. Hairy; lfts. 7—9, obl. obtuse; stip. and bracts setaceous. Mex. Blue.
7 **L.** vàrius. Small and delicate; calyx appendaged, lips 2-fid and 3-fid. Blue.

31. LABÚRNUM, Benth. Calyx campanulate, bilabiate, upper lip 2-, lower 3-toothed. Vex. ovate, erect, as long as the straight wings. Fil. diadelphous (9 and 1). Leg. continuous, tapering to the base, several-seeded. ♄ ♄ Leaves palmately trifoliate. Flowers mostly yellow.

1 **L.** vulgàre L. *Golden Chain.* Arborescent; lfts. oblong-ovate, acute at base, acuminate; raceme elongated (1f), pendulous; legume hirsute. Europe. 15f.
2 **L.** alpìnum L. Arborescent; lfts. oblong-ovate, rounded at base; raceme long, simple, pendulous; legume glabrous. Alps. 30f.

32. TRIFÒLIUM, Tourn. Clover. (*Τριφύλλον* (three-leaved); Lat. *trifolium;* Fr. *trèfle;* Eng. *trefoil.*) Calyx 5-toothed. Pet. united at the base, withering. Vex. reflexed. Alæ oblong, shorter than the vexillum. Carina shorter than the alæ. Stam. 10, diadelphous (9 and 1). Legume mostly indehiscent, covered by and scarcely longer than the calyx, 1–4-seeded. Seeds roundish.—Herbs. Leaves palmately trifoliate. Leaflets with straight veinlets. Flowers in heads or spikes. Figs. 233, 354.

§ Flowers yellow, in small, dense, roundish heads. Legume 1-seeded..........Nos. 1, 2
§ Flowers cyanic,—*c* pedicellate, finally deflexed...(*a*)
—*c* subsessile, never deflexed...(*b*)
a Heads small, on stalks some ten times longer. Legume 4-seeded......Nos. 3, 4
a Heads large, on stalks two or three times longer......................Nos. 5, 6
b Calyx teeth plumose, longer than the whitish corolla...................No. 7
b Calyx teeth shorter than the purple or roseate corolla...........Nos. 8—10

1 **T. procúmbens** L. *Yellow Clover.* St. procumbent or ascending; lfts. denticulate, terminal one stalked; stip. ovate-lanceolate, acuminate, much shorter than the petioles; heads small, subglobous; style short. ① Dry soils, N. H. to Va. 1—2f. Jn.
2 **T. agràrium** L. St. ascending or erect; lfts. denticulate, all subsessile; stipules linear-lanceolate, cohering with and longer than the petiole; heads ovoid-elliptic; style equalling the pod. ① Dry fields, N. H. to Va. 1f. July.
3 **T. Caroliniànum** Mx. Slender, diffuse; lfts. cuneate-obovate, the middle one obcordate; stip. ovate-acuminate, foliaceous; cal. teeth thrice longer than its tube. ① Fields, S.
4 **T. repens** L. *White Clover. Shamrock.* St. creeping, diffuse; lfts. obcordate, denticulate; stip. narrow, scarious; cal. teeth shorter than the tube. ♃ Pastures, &c.
5 **T. refléxum** L. *Buffalo Clover.* Pubescent; ascending or procumbent; lfts. obovate, serrulate; stip. leafy, semicordate; cal. teeth nearly as long as the corolla; leg. 4-seeded. ② Prairies, W. and S. 8—16′. April—June.
6 **T. stoloníferum** Muhl. Glabrous, creeping; lfts. broadly obcordate, denticulate; stip. leafy, ovate-lanceolate; cal. teeth not half the length of the corolla; legume 2-seeded. W. States. 6—12′. May, June.
7 **T. arvénse** L. Hds. cylindrical, very hairy; cal. teeth setaceous, longer than the cor.; leaflets narrow-obovate. ① Dry, sandy fields. 5—10′. June—Aug. § Eur.
8 **T. praténse** L. *Red Clover.* Ascending, thinly hirsute; lfts. spotted, oval, entire; stip. ovate, cuspidate-acuminate; heads sessile; lower tooth of the cal. longer than the four others which are equal. ♃ Fields and meadows. 2f.
9 **T. mèdium** L. *Zig-zag Clover.* St. suberect, branching, flexuous, nearly glabrous; lfts. not spotted, oblong, subentire; stip. lanceolate, acuminate; heads ovoid-globous, pedunculate; cal. teeth setaceous, hairy. ♃ Hills, N. § Eur.

10 T. INCARNÀTUM. St. erect, flexuous; lfts. round-ovate, obtuse or obcordate, villous; spike dense, oblong, pedunculate. Italy. 2f. Red.

33. **MEDICÀGO,** L. MEDICK. Calyx 5-cleft. Cor. deciduous. Vex. free and remote from the keel. Leg. variously curved, or spirally coiled or twisted.—Lvs. pinnately 3-foliate, denticulate. European.

* Pods smooth..........Nos. 1, 2, 3. * * Pods spiny..........Nos. 4, 5, 6.

1 M. lupulìna L. *None-such.* Procumbent, pubescent; lfts. wedge-obovate; fls. yellow; pod reniform, 1-seeded. ① Waste grounds. 6—20′. May—July. §

2 M. satìva L. *Lucerne.* Erect, glabrous; lfts. oblong-lanceolate; stip. lance-linear; fls. violet-purple, large; pod spiral. ♃ Fields: rare. 2—3f. June, July. §

3 M. scutellàta L. *Snails.* Lfts. elliptical and obovate; ped. 1-3-flowered, shorter than the leaf; pod coiled like a snail-shell. Gardens. July. §

4 M. denticulàta Willd. Lfts. obovate; stip. bristly-gashed; ped. with 1—3 yellow flowers; pod loosely spiral, border doubly echinate. ① 1—2f. June. §

5 M. maculàta Willd. Lfts. obcordate, with a purple spot; ped. 2-3-flowered; pod compactly spiral, outer edge grooved and doubly spiny. ① §

6 M. intertéxta L. *Hedgehog.* Lfts. rhomboidal; stip. gashed; pod spirally coiled in 5 or 6 turns, bordered with bristly prickles. Rare. §

34. **MELILÒTUS,** Tourn. MELILOT. Legume ovoid, wrinkled, longer than the calyx, 1–2-seeded. Fls. as in Trifolium. ① ② Leaves pinnately trifoliate, leaflets toothed. Flowers in racemes. June, July.

1 M. officinàlis Willd. Fls. yellow; lfts. obovate-oblong, obtuse; stem erect, with spreading branches. Alluvion. 3f. Raceme slender, one-sided. §

2 M. alba Lam. *Sweet-scented Clover.* Fls. white; lfts. ovate-oblong, truncate, mucronate; vex. longer than the other petals. Fields. 4—6f.

35. **PSORÀLEA.** Cal. 5-cleft, campanulate. Segm. acuminate, lower one longest. Stam. diadelphous, rarely somewhat monadelphous. Pod as long as the calyx, 1-seeded, indehiscent. ♃ ♄ Often glandular-dotted. Stip. cohering with the base of the petiole. Flowers cyanic.

* Leaves, at least the upper ones, 1-foliate, lowest 3-foliate....................Nos. 1, 2
* Leaves all pinnately 3-foliate..Nos. 3, 4, 5
* Leaves pinnately 19-21-foliate..No. 6
* Leaves palmately 3-7-foliate.—*a* Silky or smooth. Fls. loosely spicate...Nos. 7, 8, 9
—*a* Villous. Flowers densely capitate .....Nos. 10, 11

1 P. canéscens Mx. Bushy, downy-canescent; lower lvs. palmately 3-foliate; lfts. roundish obovate, dotted, upper simple. Woods, S. 2f.

2 P. virgàta N. Virgate, smoothish; *lowest* lvs. pinnately 3-foliate; lfts. linear or oblong, often all simple; spikes rather dense. Ga. 2f.

3 P. stipulàta T. & G. Smoothish; lfts. elliptic-ovate, obtuse; stipules large, ovate; ped. as long as the leaves; spikes capitate. Falls of Ohio, Ky.

4 P. mililotoìdes Mx. Smoothish; lfts. lance-oblong, obtuse; stip. lanceolate; ped. much longer than the leaves. Dry soils, S. and W. 2f.

5 P. Onóbrychis N. Pubescent; lfts. ovate, acuminate; stipules filiform; ped. long, with slender spikes. Thickets, W. 3—5f. June, July.

6 P. multijùga Ell. Lfts. numerous, oblong-lanceolate, obtuse; spikes oblong; calyx villous, with long teeth. Upper country. Car. Ga.

7 P. Lupinéllus Mx. Slender, glabrous; lfts. 5—7, linear-filiform; rac. elongated; fls. violet; pod S-shaped. Woods, S. 2f. May. June.

8 **P. floribúnda** N. Canescent; lfts. 3, rarely 5. dotted, oblong to linear; rac. slender; ped. as long as the flowers (3″); pod smooth. Ill. and W. 3f. June.

9 **P. argophýlla** Ph. Erect, silky-white; lfts. elliptic, obtuse, 5, rarely 3; ped. much longer than the leaves; fls. whorled. Wis. to Dakota (Matthews.)

10 **P. subacaúlis** T. & G. Nearly stemless, hirsute; lvs. 7-foliate on very long petioles; lfts. obovate-oblong; ped. long, rigid; cal. teeth obtuse. Tenn. April.

11 **P. esculénta** Ph. Erect, rigid, diffuse, white-haired; lfts. 5, oblanceolate; petioles long, ped. longer (3′); head oblong; sep. and bracts long, pointed. Minn. to Dakota (Matthews, Colman.) 1f. Tubers farinaceous.

36. **SESBÀNIA,** Pers. Calyx bell-shaped. Vex. spreading or reflexed. Keel incurved, with long claws. Leg. linear or oblong, ∞- or few-seeded. Seeds transverse.—Lvs. abruptly pinnate, with many leaflets. Raceme axillary, loose (yellowish). Fig. 356.

1 **S. macrocárpa** Muhl. Tall, glabrous; lfts. oblong-linear, 20—30; pod linear, long, jointed, many-seeded. ① Damp, S. 3—9f. Pods 1f. Aug.—Oct.

2 **S. platycárpa** Pers. Tall, glabrous; lfts. as above; pod oblong-elliptic, valves double, the inner membranous, 2-seeded. ① S. 10f. Aug. (Glottidium Flor. DC.)

37. **AMÓRPHA,** L. LEAD PLANT. Calyx 5-cleft. Vex. concave, unguiculate, erect. Wings and keel none. Stam. exserted. Leg. oblong, somewhat curved at the point, scabrous with glandular points, 1 or 2-seeded. ♄ ♄ American. Lvs. unequally pinnate, punctate. Fls. bluish-white, small, in virgate racemes.

* Leaves stalked (lowest leaflets remote from base). Legume 2-seeded..........No. 1
* Leaves sessile or nearly so. Lfts. 16—20 pairs. Legume 1-seeded.........Nos. 2, 3

1 **A. fruticòsa** L. Scarcely pubescent; lfts. 9—19, oval, obtuse (1′); cal. teeth short, obtuse. the lowest pointed. W. and S. to Rocky Mts. 6—16f. May, June.

2 **A. herbàcea** Walt. Pubescent or not; lfts. 41—51, oblong, obtuse (7″); cal. teeth subequal, villous, upper obtuse, lower acute. South. 2—4f. June, July.

3 **A. canéscens** N. Villous-canescent; lfts. small (4″), crowded, ovate-oblong; vex. bright blue; calyx teeth equal, acute. Wis. to Ga. and W. 2–4f. July, Aug.

38. **DÀLEA,** L. Calyx subequally cleft or toothed. Pet. unguiculate, claws of the wings and keel adnate to the staminate tube half way up. Vex. free, the limb cordate. Sta. 10, united into a cleft tube. Ov. 2-ovuled. Pod enclosed in the calyx, indehiscent, 1-seeded.—Glandular-punctate. Lvs. odd-pinnate. Stipels 0. Stip. minute, setaceous. Spikes mostly dense.

D. alopecuroìdes Willd. Glabrous and much branched; lfts. 8—14 pairs, linear-oval, obtuse or retuse, punctate beneath; spike pedunculate, oblong-cylindric, silky-villous. ① Ill. to Ala. and W. 2f. Flowers white and violet. August.

39. **PETALOSTÈMON,** Mx. Calyx 5-toothed, nearly equal. Pet. 5, on filiform claws, 4 of them nearly equal, alternate with the stamens and united with the staminate tube. Stam. 5, monadelphous, tube cleft. Leg. 1-seeded, indehiscent, included in the calyx. ♃ Leaves unequally pinnate, exstipellate. Flowers in dense, pedunculate, oblong spikes or heads.

§ KUHNÍSTERA Lam. Heads corymbed, each with an involucre of scales; calyx teeth long, plumous, pappus-like, setaceous..................................No. 5
§ PETALOSTÈMON *proper*. Spikes solitary, not involucrate. Calyx teeth short...(*a*)
a Bracts awn-pointed, longer than the calyx. West..................Nos. 1, 2
a Bracts not awned, short, acute or obtuse. South..................Nos. 3, 4

1 **P. cándidum** Mx. Glabrous, erect; lfts. 7—9, all sessile, linear-lanceolate, mucronate, glandular beneath; spikes on long peduncles; bracts longer than the white petals. Dry prairies, S. and W. Slender. 3f. Leaflets 1′. July.

2 **P. violàceum** Mx. Minutely pubescent, erect; lfts. 5, linear, glandular beneath; spikes pedunculate; bracts shorter than the violet petals. Prairies, West. 2f. Leaflets 1′. Heads 1′ long, brilliant. July, Aug.

3 **P. cárneum** Mx. Glabrous, erect; lfts. 5—7, lance-linear; spikes oblong, pedunculate; bracts obovate; pet. oblong. Ga. and Fla. Slender. 1—2f. Rose-wh. Aug.

4 **P. grácile** Nutt. Glabrous, decumbent at base; lfts. 7; lance-linear; spikes somewhat sessile; bracts acute; petals ovate. Pine woods, Fla. and W. 1—2f. White.

5 **P. corymbòsum** Mx. St. corymbously branched; spikes capitate, sessile; bracts broad, colored, the outer leaf-bearing; lfts. linear, 5—7. South. 2f. White. Sept.

40. ASTRÁGALUS, L. MILK VETCH. Calyx 5-toothed. Pet. elongated, erect, clawed. Vex. narrow, equalling or exceeding the obtuse keel Stam. diadelphous (9 and 1). Legume mostly turgid, 2-valved, 1-celled, or 2-celled partly or completely by the intrusion of the sutures. Seeds 1—∞, funiculus slender. ♃ chiefly. Leaves unequally pinnate. Flowers in spikes or racemes. (Including Phaca, L.)

§ Legume abruptly stipitate, oblong, straight-pubescent........................ Nos. 1, 2
§ Legume sessile in the calyx.—*a* Fls. white or yellowish...(*b*)
—*a* Fls. blue or tipped with blue...(*c*)
b Legume straight, ovoid-oblong, smooth, dry, turgid......................Nos. 3, 4
b Legume curved, oblong, woolly or veiny, dry, flattened.......................Nos. 5, 6
c Legume curved, crescent-shaped, 1-celled, smooth.........................No. 7
c Legume globular, fleshy; when dry splitting into two.....................Nos. 8, 9

1 **A. Robbínsii** Oakes. Erect; lfts. 5—11, elliptical; cor. white, twice longer than the calyx; pod puberulent, 1-celled. Rocky shores, Vt. Rare. 8—14′. Cor. white, 5″. May, June.

2 **A. alpìnus** L. Diffuse; lfts. 13—21, ovate; cor. blue above, thrice longer than the calyx; pod pubescent with black hairs, 2-celled. Mts. Vt. Me. Can. June, July.

3 **A. Canadénsis** L. Canescent, tall; lfts. 21—31, elliptical; bracts as long as the calyx; fls. greenish; pod 2-celled. Banks. 2—3f. Pod 6″. July, August.

4 **A. Cooperi** Gray. Smoothish; lfts. 13—27, elliptical; rac. exceeding the leaves; fls. white; pod inflated, 1-celled, roundish-ovate, with a deep groove at the ventral suture. Banks, N. Y. and W. 1—2f. June, July. (Phaca neglecta T. & G.)

5 **A. glàber** Mx. Erect, smoothish; lfts. 15—23, lance-oblong or linear; spikes loose; pod smooth, flattened, 2-celled. Pine woods, S. 1—2f. Flowers greenish. July.

6 **A. villòsus** Mx. Low, villous; lfts. 9—15, oblong-oval; rac. ovoid, dense; pod 3-angled, 1-celled, clothed with long hairs. Dry, S. 3—6′. Fls. dull yellow. Mar. Apr.

7 **A. obcordàtus** Ell. Low, assurgent, smoothish; lfts. 7—12 pairs, 4″, oblong to obovate, cordate at apex; ped. as long as the leaves, 8-15-flowered; pod deflexed, incurved, pointed. Ill. to Ga. 6—10′. April—June. (A. distortus T. & G.)

8 **A. caryocárpus** Ker. Low, diffuse, whitish, downy or nearly smooth; leaves stalked; lfts. 15—21, obovate; ped. longer; fls. 8—10″, capitate; pod as large as a grape, smoothish, eatable. Ill. W. and S. May. (A. Mexicana DC.)

9 **A. Platténsis** N. Villous, diffuse; lfts. 8—12 pairs, oblong; stip. lanceolate; rac. capitate; pod ovoid, villous. Gravel, Ill. Tenn. and W. May.

41. TEPHRÒSIA, L. GOAT'S RUE. CAT-GUT. Calyx with 5, nearly equal, subulate teeth. Bracteoles 0. Vex. large, orbicular. Keel obtuse, cohering with the wings. Sta. diadelphous (in the following species) or monadelphous. Legume linear, much compressed, many-seeded. ♃ Lvs. unequally pinnate. Leaflets mucronate. Flowers white-purple.

§ Flowers large (9—10″ long) in a leafy terminal cluster. Lfts. 15—27....................No. 1
§ Fls. small, spicate, on long peduncles.—*a* Lfts. 9—17. Pods downy.......Nos. 2, 3, 4
—*a* Lfts. 5—9. Pods smoothish........Nos. 5, 6

1 **T. Virgínica** Pers. Erect, villous; lfts. oblong; fls. subsessile, axillary and terminal, variegated with white, rose, and purple; pod villous. Dry. 1—2f. July.

2 **T. spicàta** T & G. Rusty-villous, diffuse; lfts. oval-oblong, obtuse or retuse; ped. very long; calyx teeth longer than tube. S. 1—3f. July.

3 **T. hispídula** Ph. Minutely hispid or pubescent, slender, decumbent; lfts. elliptic-oblong, acute; cal. teeth not longer than tube. S. 1—2f. May—July.

4 **T. ambígua** M. A. Curt. Smoothish, decumbent; lfts. 7—15, oblong-oblanceolate, truncate, brownish beneath; ped. angular, 2-3-flowered, as long as the leaves; calyx teeth shorter than tube. S. 1f. June, July.

5 **T. grácilis** Wood. Slender, diffuse, subglabrous; lvs. stalked; lfts. oblong-obovate, emarginate; ped. twice longer than the leaves; fls. on slender pedicels; cal. teeth very short; pod smooth. Fla. to La. 6—12′.

6 **T. chrysophýlla** Ph. Prostrate, rust-pubescent; lvs. sessile; lfts. round-obovate, acutish, wavy, yellowish; peduncs. much longer than the leaves; calyx teeth subulate. Dry woods, Ga. Fla. to Tex. 10—20′. May—July.

42. **INDIGǑFERA,** L. INDIGO-PLANT. Calyx with 5 acute segments. Vex. roundish, emarginate. Keel spurred each side, at length reflexed. Legume 2-valved, 1 to ∞-seeded. ♄ ♃ Stip. small, distinct from the petiole. Leaves odd-pinnate. Legume pendulous.

§ Racemes longer than the leaves. Leaflets obovate-oblong, obtuse.........Nos. 1, 2
§ Racemes shorter than the leaves. Leaflets oval. Naturalized South.......Nos. 3, 4

1 **I. Caroliniàna** Walt. Erect, branched; lfts. 11—15, petiolulate; fls. yellowish-brown; pod oblong, veiny, rugous, 2-seeded. Sandy woods, S. 3—7f. July—Sep.

2 **I. leptosépala** N. Decumbent, strigous; lfts. 7—9, subsessile; calyx teeth subulate; fls. pale-scarlet; pod linear, 6-9-seeded. Ga. Fla. to Ark. 2—3f.

3 **I.** TINCTÒRIA L. Erect; lfts. 9—11; pod terete, torulous, curved. Waste pl. § E. Ind.

4 **I.** ANIL L. Erect; lfts. 7—11; pod flattened, even, with thick edges. Waste. § W. Ind.

43. **ROBÍNIA,** L. LOCUST. Calyx 5-cleft, the 2 upper segments more or less coherent. Vex. large. Alæ obtuse. Sta. diadelphous (9 and 1). Style bearded inside. Legume compressed, elongated, many-seeded. ♄ ♄ With stipular spines. Lvs. odd-pinnate. Fls. showy, in axillary racemes. Fragrant. Fig. 402.

1 **R. Pseudacàcia** L. *Common Locust.* Branches armed with spines; lfts. ovate and oblong-ovate; rac. pendulous, white, smooth, as well as the pods. Penn. S. and W. Introduced everywhere. 30—80f. Wood very durable. April, May.

2 **R. viscòsa** Vent. *Clammy Locust.* Spines very short; branchlets, petioles, and pods glandular-viscid; lfts. ovate; rac. crowded, erect, roseate. Mts. S. 40f. Ap. Jn. †

3 **R. híspida** L. *Rose Acacia.* Spines almost wanting, shrub mostly hispid; rac. loose, mostly pendulous; fls. large, rose-red. Mts. S. 3—8f. May, June. †

44. **COLǓTEA,** L. BLADDER SENNA. Calyx 5-toothed. Vex. with 2 callosities, expanded, larger than the obtuse carina. Stig. lateral, under the hooked summit of the style, which is longitudinally bearded on the back side. Legume inflated, scarious. ♄ Leaves odd-pinnate.

C. ARBORÉSCENS L. Lfts. elliptical, retuse; vex. shortly gibbous behind. Mt. Vesuvius. 8—12f. Leaflets about 9. Flowers large, yellow. June—Aug.

45. WISTÀRIA, Nutt. Cal. bilabiate, upper lip emarginate, the lower one 3 subequal teeth. Vex. with 2 callosities ascending the claw and separating above. Wings and keel falcate, the former adhering at top. Legume torulous. Seeds many, reniform. ♄ Leaves odd-pinnate. Raceme large, with large, colored bracts. Flowers lilac-purple.

1 **W. frutéscens** DC. Pubescent when young, at length glabrous; lfts. 9—13, ovate or elliptic-lanceolate, acute; raceme densely ∞-flowered; calyx teeth obtuse; ovary glabrous. Swamps, S. 15—30f. Woody. April, May.

2 **W.** consequàna Benth. Pubescent; lfts. 9—13, ovate or oblong-lanceolate, acuminate; raceme loose, pendulous, 1f long; calyx teeth acuminate. China. April.

46. ÀPIOS, L. Ground Nut. Calyx obscurely bilabiate, the upper lip of 2 very short, rounded teeth, the 2 lateral teeth nearly obsolete, the lower one acute and elongated. Keel falcate, pushing back the broad, plicate vex. at top. ♄ Glabrous. Root bearing edible tubers. Leaves pinnately 5–7-foliate.

A. tuberòsa Ph. St. twining; lfts. ovate-lanceolate; rac. shorter than the lvs. Thickets and shady woods. 2—8f. Rac. 1—3′ long. Fls. brownish-purple. Handsome. Jl. Aug.

47. VÍGNA, Savi. (To *Dominic Vigna*, commentator on Theophrastus.) Calyx of 4 lobes, the upper twice broader, the lower longer. Vex. broad, with 2 callosities near the base of the limb. Keel not twisted. Stigma lateral. Legume terete. ♄ Leaves pinnately trifoliate.

V. hirsùta Feay. Plant hirsute, the stem retrorsely so; cal. with 1 bractlet at base; segm. all acute, the lower acuminate; lfts. ovate-lanceolate, pointed. Marshes, S. Car. Fla. to La. 6—10f. Flowers pale yellow, 6″. Pod 2′, 4–6-seeded. July—Sept.

48. RHYNCHÒSIA, DC. Calyx somewhat bilabiate, or 4-parted, with the upper segment 2-cleft. Vex. without callosities. Keel falcate. Style glabrous. Legume oblique, short, compressed, 1–2-seeded. Seeds carunculate. ♃ ♄ Leaves resinous-dotted beneath, pinnately 3-foliate, sometimes reduced to a single leaflet. Flowers yellow.

§ Phaseoloideæ. Twining. Raceme long, ∞-flowered. Calyx teeth short....No. 1
§ Arcyphyllum. Low, or twining. Flowers in fascicles or short racemes.
Calyx teeth leafy, as long as the corolla...........................Nos. 2, 3, 4
§ Orthodànum. Erect. Ped. 1-flowered, axillary. Calyx teeth subulate......No. 5

1 **R. mínima** DC. Scrambling; lfts. thin, rhomboidal; rac. with about 12 remote, reflexed fls.; pod torulous, 6″ long. Banks, S. Car. to Fla. and La. 3—5f, delicate.

2 **R. simplicifòlia** (Ell.) Low, erect, pubescent; lvs. reduced to a single leaflet, orbicular or reniform, obtuse. Sandy woods, S. 1—3′. Leaves 1½′. April, May.

3 **R. volùbilis** Wood. Twining, pubescent; lvs. 3-fol.; lfts. oval or orbicular; rac. 3–10-flwd.; calyx teeth ovate, cuspidate. Dry woods, S. 3—4f. Lfts. 1′. June, July.

4 **R. erécta** Wood. Tall, velvety pubescent; lvs. 3-foliate; lfts. oval, acute; sepals scarcely united, lance-ovate to linear. Dry. Md. to Fla. 2—5f. June—Aug.

5 **R. galactoìdes** Chapm. St. erect, rigid, branched; lfts. small, elliptic or oval, margins revolute; ped. half as long as the flowers. Ala. Fla. 2—3f.

49. PHASEÒLUS, L. Kidney-bean. Cal. upper lip 2-toothed, lower 3-toothed. Keel with the stamens and style spirally twisted. Leg. compressed and falcate, or cylindric, many-seeded. Seeds compressed, reniform. Leaves pinnately trifoliate. Leaflets stipellate. Figs. 157, 203–4, 214.

§ Flowers arranged in racemes. Legume falcate. July—Sept. ....No. 1
§ Flowers few, capitate on long stalks. Legume straight, linear......... ...Nos. 2—4
Exotic.—*a* Stems climbing.... ....Nos. 5, 6, 7
—*a* Stem erect, bushy. ....No. 8

1 **P. perénnis** Walt. *Wild Bean Vine.* Twining, pubescent; rac. paniculate, mostly in pairs, axillary; lfts. ovate, acuminate, 3-veined; leg. pendulous, falcate, broad-mucronate. Dry woods: common. 4—7f. Pod 2′.

2 **P. diversifòlius** Pers. St. prostrate, scabrous; lfts. angular, 2-3-lobed or entire; ped. longer than leaf; pod pubescent, broadly-linear, cylindric. ② Sandy shores. 3—5f.

3 **P. hélvolus** L. St. slender; lfts. between oblong-ovate and lance-ovate, not lobed; ped. slender, several times longer than the leaves; pod straight, cylindric, 8–10-seeded. ♃ Sandy fields. 3—5f.

4 **P. paucifiòrus** Benth. Stem slender, retrorsely hirsute; lfts. linear-oblong, not lobed, as long as the petiole, hirsute; pod hirsute, 5–8-seeded. Prairies, Ill. (Mead) and W. 2—4f.

5 **P.** VULGÀRIS. Lfts. ovate, acuminate; rac. solitary; pod pendulous, long-pointed; seed reniform, variously colored. ① E. Ind. Flowers white. 3—8f.

6 **P.** LUNÀTUS. *Lima B.* Lfts. ovate-deltoid; pod broad, flat, falcate, with large, flat, white seeds; flowers whitish. ① E. Ind. 6—12f.

7 **P.** MULTIFLÒRUS. *Scarlet Pole B.* Lfts. ovate, acute; rac. as long as the lvs.; fls. scarlet; pod pendulous, seeds reniform. ① S. Am. 6—10f.

8 **P.** NANUS. *Bush B.* Lfts. broad-ovate, acute; pod torulous; flowers and seeds white. ① India. 1f. There are many varieties.

50. ERYTHRÌNA, L. Calyx truncate or lobed. Vex. long, lanceolate, with no callosities. Wings and keel much smaller. Stam. straight, nearly as long as the vexillum. Style glabrous. Legume torulous. ♄ ♄ ♃ Often prickly. Leaves pinnately trifoliate. Flowers racemed.

1 **E. herbàcea** L. Glabrous; lfts. rhombic-hastate, with 3 rounded, shallow lobes; petioles with here and there a small hooked prickle; rac. terminal; flowers slender, deep scarlet, 2′. Rich soils, S. Rhizome thick. 3—4f. April.

2 **E.** CRISTA-GALLI. Shrub or tree; lfts. ovate or elliptical, with hooked prickles beneath; banner recurved; fls. scarlet, in large racemes. Planted South.

51. AMPHICARPÀEA, Ell. PEA-VINE. Calyx with 4 or 5 nearly equal segments. Pet. oblong. Vex. with the sides appressed. Stig. capitate. Ovary on a sheathed stipe. Leg. flat, 2–4-seeded. ① Slender, twining. Leaves pinnately trifoliate. The upper flowers complete, but usually barren, the lower apetalous and fruitful.

1 **A. monoìca** Nutt. St. retrorsely pubescent; lfts. ovate, thin; cauline racemes pendulous; cal. segm. very short; bracts minute. Woods. 4—8f. Very slender. Flowers pale purple. Upper pods 4-seeded, lower 1-seeded. July—Sept.

2 **A. Pítcheri** T. & G. Stem rusty-villous; lfts. rhomboid-ovate; rac. erect, often branched; bracts broad, conspicuous. N. Orleans and W. Seeds blackish.

52. GALÁCTIA, L. Cal. bibracteolate, 4-cleft, the segments of nearly equal length, upper one broadest, entire. Pet. oblong. Vex. broadest and incumbent. Keel petals slightly cohering at top. Legume many-seeded. ♄ ♄ ⌞ Lvs. pinnately compound. Rac. axillary. Fls. purplish. Aug. Sept.

§ Leaves pinnate, 7–9-foliate. Sts. prostrate, twining. Lvs. coriaceous.........No. 1
§ Leaves pinnately 3-foliate. Sts. prostrate, twining. Pods 12—18″ long...Nos. 2—4
§ Leaves pinnately 3-foliate. Sts. erect or ascending. Petioles longer than lfts..Nos. 5, 6

1 **G. Ellióttii** N. Lfts. elliptic-oblong, obtuse; ped. longer than the lvs., few-flwd. at the top; upper sep. (double) broad-ovate. ♃ Ga. Fla. 3—7f. Rose-white. May, Jn.

2 **G. glabélla** Mx. St. nearly glabrous; lfts. elliptic-oblong, emarginate at each end, shining above, a little hairy beneath; rac. pedunculate, about the length of the leaves; flowers 6″, pedicellate. ♃ Arid soils, N. J. to Fla. 2—4f. Rose-purple.

3 **G. mollis** Mx. St. softly pubescent; lfts. oval, obtuse, nearly smooth above, softly villous and whitish beneath; rac. longer than the leaves, pedunculate, fasciculate; fls. 4″, on very short pedicels; pod villous. ♃ Dry soils, Md. to Ga. 2—4f.

β. ***microphýlla.*** Lfts. small (4—6″), oval; fls. solitary, and nearly sessile in the upper axils; pods 5 or 6-seeded. Ga. Fla. (Miss S. Keen.)

4 **G. pilòsa** N. St. pubescent or smoothish; lfts. thin, oblong-ovate or oval, obtuse or retuse at both ends; rac. very slender, twice or thrice longer than the leaves, with scattered, distant flowers. ♃ Dry soils, S. 3—7f. Leaflets 1—2′. Flowers 4″.

5 **G. brachýpoda** T. & G. Slender, branching; lfts. oblong, odd one petiolulate; rac. stalked, shorter than the leaves. ♃ Sandy woods, W. Fla. 2—3f, ascending.

6 **G. sessiliflòra** T. & G. St. simple, flexuous; lfts. oblong-linear, odd one subsessile; rac. very short, sessile. Sandy woods, S. 1—2f. Lfts. 1′—20″. Pod erect.

53. DÓLICHOS, L. Calyx 4-lobed, the upper lobe 2-toothed or entire. Vex. with 2 or 4 callosities at the base of the limb. The free stamen spurred at base. Legume flattened with a few oval, flattened seeds. ♭ Leaves pinnately 3-foliate.

1 **D. multiflòrus** T. & G. Lfts. ample, orbicular, acute, thin, pubescent; racemes equalling the petioles, densely ∞-flwd. at the top of the stout peduncle; calyx upper lip entire; pod 4–5-seeded. ♃ Banks, Ga. to La.

2 **D. Hàlei** Wood. Lfts. ample, round-ovate, acuminate; petioles 3 times longer than the few-(3–8)-flwd., stalked raceme; pod broad, 2–3-seeded, the point incurved. ♃ N. Orleans and W. (Dr. J. Hale.) Pod 2′.

3 **D.** SESQUIPEDÀLIS. Pods smooth, subterete, very long (1f). W. Ind. † South.

4 **D.** CAT-IANG. Pods linear, erect, twin at top of the long ped. E. Ind. † South.

54. CLITÒRIA, L. Calyx bibracteolate, 5-toothed, segm. acuminate. Vex. large, spreading, roundish, emarginate, not spurred. Keel smaller than the wings, acute, on long claws. Legume linear-oblong, torulous, several-seeded. ♭ Leaves pinnately 3–5-foliate. Flowers very large, solitary, or several together.

C. Mariàna L. Glabrous: lfts. 3, oblong-ovate or lanceolate, obtuse, lateral ones petiolulate; ped. short, 1–3-flwd.; bracteoles and bracts very short; pod 3–4-seeded. ♃ Dry soils, N. J. to Fla. 1—3f. Flowers pale purple. July, Aug.

55. CENTROSÈMA, DC. Sep. lance-linear, slightly united, the lower longest and with 2 broad bractlets. Vex. very large, with a short spur on the back near the base. Keel and stamens much shorter, incurved. Legume long, linear, margined and long-pointed. ♭ Leaves pinnately 3-foliate. Flowers very large, purple.

C. Virginiàna Benth. St. very slender; lfts. oblong-ovate to oblong-linear, firm, very veiny, the veins incurved; ped. 1–4-flowered, bractlets larger (not longer) than the calyx; pod veined along the margin. ♃ Dry soils, S. 2—5f. July, August.

56. KENNÈDYA, Vent. Two upper lobes of calyx half-united. Banner broad, spreading, keel as long as the wings, incurved. Legume linear. ♄ Australian twiners with brilliant flowers in clusters. Leaves 3-nate.

1 K. COMPTONIÀNA. Smoothish; lfts. 3, ovate, retuse, veiny; peduncle bearing an erect raceme of many bright blue flowers, very ornamental in the conservatory. 12f.

2 K. RUBICÚNDA. Hairy; lfts. ovate; ped. 3-flwd., fls. dark-red or crimson, to scarlet. 5f.

57. HARDENBÈRGIA, Benth. Two upper teeth of calyx united. Banner broad, spreading, keel much shorter than wings. Legume linear. ♄ Australian. Flowers in racemes, very delicate. Leaflet mostly but 1.

H. MONOPHÝLLA. Plant very smooth; lft. lance-ovate; rac. erect; fls. blue-purple. 10f.

58. ACÀCIA, Necker. Calyx valvate, 4- or 5-toothed. Pet. 4 or 5, small, distinct or nearly so. Sta. numerous, distinct. Legume not jointed, dry, 2-valved, ∞-seeded. Beautiful trees or shrubs, native of warm climates. Lvs. twice pinnate, or reduced to phyllodia (§ 321). Fls. yellow or yellowish, in spikes or heads, very numerous and showy.

§ Leaves bipinnate. Flowers collected in heads or spikes.....................Nos. 1—3
§ Leaves abortive—reduced to flattened petioles (phyllodia) with their edges
vertical. Flowers yellow,—*x* in globular, solitary heads..............Nos. 4, 5
—*x* in globular, racemed heads............Nos. 6, 7
—*x* in cylindrical spikes...................Nos. 8—11

1 A. Farnesiàna L. *Sponge Tree.* Tree armed with straight stipular spines; lvs. with 4—8 pairs of pinnæ, leaflets 15—20 pairs, oblong, crowded; ped. 2 or 3 together. Naturalized along the Gulf, Fla. to N. Orleans. Pods 2—3′ long. (Vachellia, C-B.)

2 A. ÁLBICANS. Shrub from Mexico, 5f, with stipular spines, silvery-pubescent; leaves with 8 or 9 pairs of pinnæ, leaflets 10—30 pairs, linear-oblong, glabrous; flowers white, the heads in axillary racemes, 2—5 together.

3 A. DEALBÀTA. Shrub thornless, 5f, from N. Holland, all velvety-pubescent; pinnæ 15 pairs, leaflets 30—35 pairs, linear, crowded; heads in axillary racemes.

4 A. JUNIPERÌNA. Shrub from N. Holland, spinescent; phyllodia linear-subulate, pungent; branches terete, hairy or downy; heads solitary; petals 5.

5 A. ARMÀTA. Shrub 5—8f, downy or hairy, with spinescent stipules; phyllodia half-oblong-ovate, entire, 1-veined; heads solitary; pods velvety. N. Holland.

6 A. VESTÍTA. Shrub 6f, clothed with a soft down; leaves (phyllodia) halved, elliptic-oblanceolate; heads loosely racemed along the ped., one being terminal. N. Holland.

7 A. CULTRIFÓRMIS. Shrub 5f, smooth and glaucous; leaves curved, triangular-lanceolate, coriaceous; heads in racemes, panicled at the end of the branches.

8 A. VERTICILLIÀTA. Shrub bushy, leafy, with the phyllodia and leaf-like stipules crowded and irregularly whorled; spikes oblong, solitary, axillary. New Holland.

9 A. LONGIFÒLIA. Shrub 5f, unarmed, with the phyllodia long, linear-lanceolate, 3-veined at base, veiny above; spikes axillary, in pairs; flowers 4-parted. N. S. Wales.

10 A. LINEÀRIS. Shrub 5f, unarmed, with phyllodia very long (7′) and narrowly linear, 1-veined; spikes axillary, many, often branched; calyx 4-parted.

11 A. FLORIBÚNDA. Shrub or small tree, 6—10f; phyllodia linear-lanceolate, attenuate both ways, 3-5-veined; spikes simple, axillary, solitary; calyx 4-toothed. N. Holland.

59. POINCIÁNA, L. Sepals 5, united just at base. Petals broad, unguiculate, spreading. Stam. 10, very long, decurved with the slender style. Legume flat. ♄ Tropical. Leaflets very many, no odd one. Fls. large.

1 P. PULCHÉRRIMA. Shrub prickly (used in the W. Ind. for hedges, hence called *Flower-fence*); leaflets oval-oblong; fls. 2′ broad, orange, with crimson filaments 2′ long. 10f.

2 **P.** Gillèsii. From S. Am. Thornless; lfts. very small; fls. 2′, ylw., the pet. subequal, subsessile, glandular-ciliate at apex.

3 **P.** regia, has crimson flowers 3′ broad, the petals long-clawed, crenate-edged, upper one spotted. From Madagascar. 10f.

60. **CALLÍSTACHYS,** Vent. Calyx 2-lipped. Banner erect, keel and wings deflexed. Stam. 10, separate, as in Baptisia. Style incurved. Pod woody before ripening, many-seeded. ♄ From New Holland. Leaves 3-foliate but sessile. Flowers yellow, in a terminal cluster.

1 **C.** lanceolàta. Hairy, half-shrubby; leaflets lanceolate, apparently *whorled* in 3's.
2 **C.** ovàta. Pubescent; leaves ovate, acute; spike short and broad, many-flowered.

61. **SOPHÒRA,** L. Keel obtuse, not shorter than the wings or roundish banner. Pod stipitate, many-seeded, moniliform, indehiscent. Seeds globular. ♄ ♄ Leaves odd-pinnate. Panicles terminal.

1 **S. tomentòsa** L. Shrub 4—6f, hoary-tomentous; lfts. about 13, oblong, thick; fls. in long racemes, yellow, handsome; calyx obscurely 5-toothed; pod 6′. Coast, Fla.
2 **S.** Japónica. Tree 30—40f, from Japan, hardy from Philadelphia south. Leaflets about 13, smooth; panicles large, erect, open, white, in July and August.

62. **CHORÒZEMA** ilicifolia. Shrub from N. Holland, 3f, bushy, with thick spinescent, holly-like, simple leaves, and a profusion of deep orange or scarlet racemes. Calyx 2-lipped. Keel shorter than the wings. Pod inflated, many-seeded.

63. **ORÒBUS,** Tourn. BITTER VETCH. Calyx obtuse at base, deeper cleft on upper side. Cor. long, keel incurved, shorter than wings or banner. Sty. terete, downy above. ♃ Lfts. 2—12, rachis ending in a short point.

1 **O.** vérnus. Lfts. 6, ovate, pointed; stip. ½-sagit., entire; fls. blue and purp. Apr. 1f.
2 **O.** niger. Branched, 3f; lfts. 12, ovate to oblong; flowers dark purple. June—Aug.
3 **O.** atropurpùreus. Leaflets 6, linear; flowers dark purple, in long 1-sided racemes.

64. **LENS** esculénta. LENTIL. Herb cultivated for food at the East since the times of Esau, seldom seen here. Stem weak, 1f. Leaves of many pairs of oblong leaflets, ending in a branched tendril. Raceme of 2 or 3 pale flowers succeeded by a short broad pod. Seed exactly lens-shaped, giving the name. ①

65. **CÝTISUS,** L. Cal. 2-lipped, with 5 teeth, keel obtuse, straightish. Style incurved or at length involute. Seeds with a *scale* at the hilum (strophiolate). ♄ Leaves of 3 leaflets, the upper becoming simple.

C. scopàrius. *Scotch Broom.* Shrub with smooth angular, virgate branches; lfts. oblong; pedicels solitary, axillary; flowers yellow, showy; pods hairy at edge. Europe.

66. **TRIGONÉLLA** Fœnum-Græcum. FENUGREEK. Herb from Europe, in gardens. Cult. for its strong-scented herbage. 2f. Lfts. 3, cuneate at base. Fls. axillary, sessile, small, white. Pods linear, long, slightly falcate at point, 2 or 3 together.

67. **CLIÁNTHUS,** Soland. Cal. bell-form, 5-cleft. Banner lance-ovate, acuminate, reflexed, keel boat-shaped, decurved, as long as the banner, longer than the narrow wings. Pod oblong, inflated. ♄ From New Zealand. Leaves odd pinnate. Flowers large and splendid.

1 **C.** punìceus. Shrub smoothish, 4f; leaflets about 17, oblong, retuse, alternate; flowers 3′ wide, crimson-red, in dense hanging racemes of superb appearance.
2 **C.** Dampiérii. Shrub hairy, 4f; leaflets about 17, oval, acute; flowers very large, scarlet, with a black prominence at the base of the banner. Flowers freely.

ORDER XLIV. ROSACEÆ. ROSEWORTS.

Herbs, shrubs, or *trees,* with alternate, stipulate leaves and regular flowers. *Sepals* 5, rarely fewer, united, often re-enforced by as many bractlets. *Petals* 5, rarely 0, distinct, inserted on the disk which lines the calyx tube. *Stamens* ∞, rarely few, distinct, inserted with the petals (perigynous). *Ovaries* 1, 2, 5, or ∞, distinct, or often coherent with each other, or immersed in the tube of the calyx. *Fruit* a drupe, or achenia, or a dry or juicy etærio (§ 158), or pome. *Seeds* 1 or few in each carpel, anatropous, exalbuminous. *Embryo* straight. Figs. 5, 35, 38, 117, 139, 158, 183–5, 188, 197, 244, 251, 285, 297, 300–1, 307, 358, 365–6, 400, 428.

A Ovary superior, and the fruit not enclosed in the tube of the calyx...(*a*)
A Ovary inferior, and the fruit enclosed in the calyx tube...(*m*)
a Carpel 1, forming a drupe in fruit. Calyx deciduous. Trees or shrubs...(*b*)
a Carpels 2— ∞. Calyx persistent, bractless. Shrubs or herbs...(*c*)
a Carpels 4— ∞. Calyx persistent, with 5 bractlets added. Herbs mostly...(*f*)
b TRIBE I. CHRYSOBALANEÆ.—Style lateral. Ovules 2, ascending......CHRYSOBALANUS. 1
b TRIBE II. AMYGDALEÆ.—Style terminal. Ovules 2, pendulous.........PRUNUS. 2
c TRIBE III. SPIRÆEÆ.—Carpels 2—8, several-seeded follicles in fruit...(*d*)
d Petals obovate, equal, imbricate in the bud..........................SPIRÆA. 3
d Petals lance-linear, convolute in the bud............................GILLENIA. 4
c TRIBE IV. RUBEÆ.—Carpels 2— ∞, 1-seeded drupes or achenia....(*e*)
e Shrubs unarmed. Carpels 5—8. Petals 5 (or ∞), yellow...............KERRIA. 5
e Shrubs unarmed. Carpels 2—4. Petals 0. Calyx leafy.. ....NEVIUSIA. 6
e Shrubs prickly. Carpels ∞, drupaceous and juicy.................. ..RUBUS. 7
e Herbs not prickly. Carpels 5—10 (2—6 in No. 12), dry.................DALIBARDA. 8
f TRIBE V. FRAGARIDEÆ.—Carpels 4— ∞, 1-seeded achenia in fruit...(*g*)
g Style persistent on the dry achenia.—*h* Petals 8 or 9......................DRYAS. 9
—*h* Petals 5...........................GEUM. 10
g Style deciduous.—*k* Torus pulpy, globular, red.......................... ....FRAGARIA. 11
—*k* Torus spongy or dry.—*l* Bractlets minute or 0.....WALDSTEINIA. 12
—*l* Bractlets 5...............POTENTILLA. 13
m TRIBE VI. SANGUISORBEÆ.—Carpels 1—3, acheniate. Petals 0 or 5...(*n*)
n Stamens 1—4. Style lateral. Flowers apetalous, scattered............ALCHEMILLA. 14
n Stamens 4— ∞. Style terminal. Flowers apetalous, spicate.........POTERIUM. 15
n Stamens 10—15. Styles 2. Petals 5, yellow...............................AGRIMONIA. 16
m TRIBE VII. ROSEÆ.—Carpels ∞, 1-seeded, free in the calyx tube.......ROSA. 17
m TRIBE VIII. POMEÆ.—Carpels 2—5, consolidated with the calyx tube...(*o*)
o Petals oblong-spatulate. Carpels half-2-celled..........................AMELANCHIER. 18
o Petals roundish.—*p* Carpels 1-seeded..CRATÆGUS. 19
—*p* Carpels 2-seeded............................ ....PYRUS. 20
—*p* Carpels ∞-seeded .. ..CYDONIA. 21

1. **CHRYSOBALÀNUS,** L. COCOA PLUM. Calyx 5-cleft. Pet. 5. Sta. about 20, in a single series. Ov. solitary, sessile, the style arising from the base. Ovules 2, collateral. Drupe 1-seeded, with thin pulp. ♄ With entire, veiny leaves, minute stipules, and terminal panicles.

C. oblongifòlius Mx. Lvs. oblong, varying to oblanceolate, subsessile, pedicels and calyx tomentous-hoary; filaments and ovary glabrous; drupe as large as a plum. Pine-barrens, Ga. Ala. Fla. 8—12f. Leaves shining. Flowers small, white.

2. **PRUNUS,** Tourn. PLUM, &c. Calyx 5-cleft, the tube bell-shaped or cup-shaped, deciduous. Pet. 5, spreading. Sta. 15—30. Ov. solitary, with 2 pendulous ovules. Drupe fleshy, with a bony nucleus. ♄ ♄ Fruit mostly edible. Fls. white or purplish. Figs. 51, 119–21, 124–5, 158, 285, 297.

§ Prunus. Drupe smooth, more or less glaucous with a bloom. Stone smooth, more or less flattened. Leaves mostly convolute (rolled) in vernation. Plums...(*a*)

a Umbels 2-5-flowered. Leaves conspicuously acuminate...............No. 1
a Umbels 2-5-flowered. Leaves acute or obtuse ....Nos. 2, 3, 4
a Umbels 1-2-flowered. Leaves acute, obovate, or oval............ .Nos. 5, 6

§ Cérasus. Drupe smooth, without bloom. Stone smooth, globular. Leaves conduplicate (folded §254) in vernation. Cherries...(*b*)

b Flowers in lateral leafless umbels. Drupes small. Native.........Nos. 7, 8
b Flowers in lateral leafless umbels. Drupes large. Exotic........Nos. 9, 10
b Flowers in racemes—*c* terminating the leafy branches.... ......Nos. 11, 12
—*c* in the axils of the evergreen leaves. ....No. 13

§ Armenìaca. Drupe soft-velvety. Stone smooth, compressed. Lvs. convolute in bud, expanding after the flowers. Apricots.............Nos. 14, 15

§ Amýgdalus. Drupe tomentous or smooth. Stone rugous-furrowed, compressed. Leaves conduplicate in vernation...(*d*)

d Fruit with a soft juicy pulp. Small trees. Peach, &c...............No. 16
d Fruit with a hard dry pulp. Trees or low shrubs. Almond...Nos, 17, 18, 19

1 **P. Americàna** Marsh. *Red Plum. Yellow Plum.* Somewhat thorny; lvs. oblong-oval and obovate, abruptly and strongly acuminate, doubly serrate; drupes roundish oval, reddish orange, with a tough skin. Low woods. 10—15f. May. †

2 **P. marítima** Wang. *Beach Plum.* Lvs. oval or obovate, slightly acuminate, sharply serrate; petioles with 2 glands; umbels few-flowered; ped. short, pubescent; fruit nearly round. Sea beach, Me. to Va. 3—4f. Fruit size of a grape. May.

3 **P. umbellàta** Ell. Lvs. lanceolate or lance-oval, acute or barely acuminate, obscurely serrulate; petioles glandless; umbels 3-5-flowered, precocious; fruit oval, small, glaucous, red. Dry soils, South. 10—15f. Fruit pleasant. May.

4 **P. Chícasa** Mx. *Chickasaw Plum.* Branches spinous; lvs. oblong-lanceolate or oblanceolate, glandular serrulate, not at all acuminate; pedicels short, smooth; drupe globous. Thickets, South. 6—12f. Fruit red or yellowish. April.

5 **P. spinòsa** L. β. ***insititia.*** *Bullace Plum.* Branches thorny; lvs. pubescent beneath; obovate-elliptical, varying to ovate, sharply and doubly dentate; umbels 1-2-flowered; fruit globular, black, glaucous. Roadsides. 15—20f. §

6 **P.** doméstica L. *Common Garden Plum. Damson Plum.* Branches unarmed; lvs. oval or ovate-lanceolate, acute; pedicels nearly solitary; drupe globous, oval, ovoid, and obovoid. Long cultivated. 15f. Italy.

7 **P. pùmila** L. *Sand Cherry.* Lvs. oblanceolate or obovate, acute, subserrate, smooth, paler beneath; umbels few-flowered, sessile; drupe ovoid. Shrub trailing in sandy soils. 1—2f. Fruit small, dark red, pleasant. May.

8 **P. Pennsylvánica** L. *Wild Red Cherry.* Lvs. oblong-ovate, acuminate, finely serrate, thin, smooth; umbels corymbous, with elongated pedicels; drupe small, ovoid-subglobous. Woods, N. 25f. Bark red-brown. May.

9 **P.** Avium L. *Ox-heart. English Cherry.* Branches erect or ascending; lvs. oblong-obovate, acuminate, hairy beneath; umbels sessile, with rather long pedicels; drupe ovoid-globous, subcordate at base. Gardens, parks. 30—50f. †

10 **P.** Cérasus L. *Sour Cherry. Large Red. Morello, &c.* Branches spreading; lvs. ovate-lanceolate, acute at apex, narrowed at base, nearly smooth; fls. with short pedicels; drupes globous. Tree 15—20f. †

11 **P. serótina** Ehr. *Black* or *Wild Cherry.* Lvs. firm, oval-oblong or elliptic, acuminate, smooth, shining above, unequally glandular-serrate; petioles with 2—4 glands; raceme long; drupes black. Woods. 50—80f. Bark black. May.

12 **P. Virginiàna** L. *Choke Cherry.* Lvs. smooth, oval or obovate, short-pointed, thin, not shining, with sharp, subulate serratures, veins bearded at base; petioles with 2 glands; raceme short. Thickets. 5—20f. Fruit blackish, astringent. May.

13 **P. Caroliniàna** Ait. *Cherry Laurel.* Lvs. oblong-oblanceolate, acuminate, on short petioles, entire, coriaceous; fls. small, in numerous, dense racemes shorter than the leaves; drupes persistent, poisonous. Banks, S. 30—50f. April. †

14 **P.** ARMENÌACA Willd. *Apricot.* Lvs. broadly ovate, acuminate, subcordate at base, denticulate; stip. palmate; fls. sessile, subsolitary; drupe large, subglobous. From Armenia. 10—15f. Fruit purple-yellow, 1—2′.

15 **P.** DASYCÀRPA Ehrh. *Black Apricot.* Lvs. ovate, acuminate. doubly serrate; petioles with 1 or 2 glands; fls. pedicellate; drupe subglobous. From Siberia. 10—15f. Fruit dark purple, in July. Flowers white, April.

16 **P.** VULGÀRIS Mill. *Peach.* Lvs. lanceolate, serrate, with all the serratures acute; fls. solitary, subsessile, preceding the leaves; drupe tomentous. Persia. 8—15f. Fls. rose-color, with the odor of prussic acid. Fruit yellow-purple.

β. LÆVIS. *Nectarine.* Drupes glabrous, yellow, purple, red, large.

17 **P.** COMMÙNIS. *Almond.* Lvs. lanceolate, serrate, with the lower serratures glandular; flowers sessile, in pairs. Barbary. 15f. Varies with flowers double.

18 **P.** NÀNA. *Dwarf single-flowering Almond.* Lvs. ovate, attenuate at base, simply and finely serrate; flowers subsessile. Russia. 3f. May, June.

19 **P.** LANCEOLÀTA. *Dwarf double-flowering Almond.* Lvs. lanceolate, doubly serrate; fls. pedicellate, covering the stems. China. 2—3f. Roseate. (Amygd. pumila, Ait.)

3. **SPIRÆ̀A**, L. Calyx 5-cleft, persistent. Pet. 5, roundish. Stam. 10—50, exserted. Carp. distinct, 3—12, follicular, 1-celled, 1–2-valved, 1–10-seeded. Styles terminal. ♄ ♃ Branches and leaves alternate. Flowers white or rose-colored. Fig. 244.

§ Shrubs, with stipulate, simple, lobed leaves. Carpels inflated... .... .No. 1
§ Shrubs, with stipulate, pinnate leaves. Carpels 5, united. Exotic............No. 2
§ Shrubs, without stipules. Leaves simple. Ovaries distinct...(*a*)
  a Flowers in umbels or corymbs.—*b* Corymb compound, terminal. Mts....No. 3
    —*b* Clusters many. Gardens. Exotic...Nos. 4—7
  a Flowers in a terminal panicle,—*c* roseate-purple.......................Nos. 8, 9
    —*c* white, rarely blush-colored.......Nos. 10—12
§ Herbs, without stipules. Leaves tripinnate. Ovaries 5, drooping... ....No. 13
§ Herbs, stipulate. Leaves pinnately divided.—*d* Flowers rose-purple.........No. 14
    —*d* Flowers white.... .....Nos. 15—17

1 **S. opulifòlia** L. *Ninebark.* Lvs. roundish, 3-lobed, doubly serrate; fls. white, in pedunculate corymbs; carp. 3—5. By streams. Rare. 4f. June.

2 **S.** SORBIFÒLIA. Lvs. odd-pinnate; lfts. lanceolate, acuminate, doubly serrate, terminal one lobed; fls. white, in terminal panicles. Siberia. 6f. May.

3 **S. corymbòsa** Raf. Lvs. ovate, cut-serrate above, whitish beneath; fls. innumerable, white or roseate, in a dense, level-topped corymb; styles and carpels generally 3. Penn. Ky. and S. 1—2f. May, June.

4 **S.** HYPERICIFÒLIA. *St. Peter's Wreath.* Lvs. obovate-oblong, subentire; fls. in many lateral clusters, on short branches, white, mostly double. Europe. 3f. May.

5 **S.** PRUNIFÒLIA. Branches virgate; lvs. ovate, petiolate, serrate, 5-veined, silky beneath; fls. in 3's—5's (very double), white. Japan. Beautiful.

6 **S.** REEVESIÀNA. Lvs. lanceolate, serrate, 3-lobed or pinnatifid, glaucous beneath; rac. capitate, pedunculate, often forming long wreaths. June.

7 **S.** TRILOBÀTA. Lvs. roundish, lobed, crenate, veiny: fls. corymbed. Alps.

8 **S. tomentòsa** L. *Hardhack.* Rusty tomentous; lvs. lance-ovate, smoothish above, serrate; rac. short, dense, aggregated into a dense thyrse-like, terminal panicle; carp. 5. Pastures, thickets. Common. 2—3f. July, Aug. †

9 **S.** DOUGLÀSII. Much like No. 8, but larger, smoother, and with redder fls. Oregon.

10 **S. salicifòlia** L. Nearly smooth; lvs. lanceolate to oblanceolate, serrate; rac. panicled, dense or lax, white, often with a blush; carp. 5. Meadows, thickets. Common. Stem purplish. 3—4f. Stam. conspicuous as in other species. July. †

11 **S.** ARIÆFÒLIA. Lvs. elliptic-oblong, crenately lobed and toothed; fls. innumerable. in large, terminal panicles, white. Oreg. 6—12f. Stems virgate. June, July.

12 S. LÆVIGÀTA. Lvs. obovate-oblong, very smooth and entire, sessile. Siberia.

13 S. Arúncus L. *Goat's Beard.* Lvs. tripinnate; lfts. oblong-lanceolate, acuminate, straight-veined, doubly serrate, odd ones lance-ovate; pan. large, of numerous slender racemes; carpels 3—5, glabrous, 1″. Mts. N. Y. to Ga. 3—5f. July.

14 S. lobàta L. *Queen-of-the-Prairie.* Lvs. pinnatifid, the term. lobe largest, pedately 7–9-parted, lobes all doubly serrate; stip. reniform; panicle large, roseate, exceedingly delicate; carpels 6—8. Low prairies, W. & S. 4—8f. June, July. †

15 S. ULMÀRIA. *Double Meadow-sweet.* Lvs. interruptedly pinnate, white-downy beneath; lfts. lance-ovate, the terminal one large, palmately 3-5-lobed. Eur. July.

16 S. FILIPÉNDULA. *Pride-of-the-Meadow.* Lfts. 9—21, pinnatifid-serrate, minute ones between; stip. clasping, large; corymbs lax; sep. reflexed. Europe. Root tuberous.

17 S. JAPÓNICA. Lvs. biternate; lfts. oblong, acuminate, cordate, their stalks bearded at base; panicle terminal; flowers with 10 stamens and 2 styles, pure white. 3—4f.

4. GILLÈNIA, Mœnch. INDIAN PHYSIC. Calyx tubular-campanulate, contracted at the orifice, 5-cleft. Pet. 5, linear-lanceolate, long. Sta. 10—15, very short. Carpels 5, connate at base. Styles terminal. Follicles 2-valved, 2–4-seeded. ♃ With trifoliate, doubly-serrate leaves.

1 G. trifoliàta Mœnch. Lfts. ovate-oblong, acuminate; stip. linear-setaceous, entire; fls. on long pedicels, in pedunculate, corymbous panicles. In woods, W. N. Y. to Ga. 2—3f. Flowers axillary and terminal, rose-white, 1½′ broad. June, July.

2 G. stipulàcea Nutt. *Bowman's Root.* Lvs. lanceolate, deeply incised; radical leaves pinnatifid; stipules leafy, ovate, doubly incised, clasping; flowers large, in loose panicles. W. N. Y. to Ala. Flowers rose-color. June.

5. KÉRRIA, DC. Calyx of 5, acuminate, nearly distinct sepals. Cor. of 5 petals. Ov. 5—8, smooth, globous, ovules solitary. Sty. filiform. Ach. globous. ♄ Stems virgate. Lvs. simple, ovate, acuminate, doubly serrate, with stipules. Flowers terminal on the branches, solitary or few together, orange yellow.

K. JAPÓNICA. *Japan Globe-flower.*—Gardens. 5—8f. Flowers double.

6. NEVIÙSIA, Gray. Calyx 5-parted, the lobes leafy, cut-serrate, persistent. Cor. 0. Sta. ∞, filiform. Ov. 2—4, 1-ovuled. Ach. drupaceous. ♄ Lvs. simple, ovate, petiolate. Stipules subulate, free. Flowers terminal, numerous, showy.

N. Alabaménsis Gr.—Tuscaloosa, Ala. (Rev. R. D. Nevius.) 2—3f.

7. RUBUS, L. BRAMBLE. Calyx spreading, 5-parted. Pet. 5, deciduous. Stam. ∞, inserted into the border of the disk. Ovaries many, with 2 ovules, one of them abortive. Achenia pulpy, drupaceous. ♄ ⌊ With ② stems, armed with prickles. Inflorescence imperfectly centrifugal. Fruit esculent, July—Sept. Flowers in May, June. Fig. 185.

§ Fruit inseparable from the juicy, deciduous receptacle. BLACKBERRIES. .(*a*)
  a Stems (mostly) erect, stout, armed with stout, recurved prickles........Nos. 1, 2
  a Stems procumbent, trailing, mostly with slender, minute prickles.....Nos. 3—5
§§ Fruit separating from the dry, persistent receptacle. RASPBERRIES...(*b*)
  b Leaves simple, lobed. Not prickly.................................Nos. 6—8
  b Leaves compound.—Stems not prickly, herbaceous............................ No. 9
    —Stems prickly, shrubby.—Corollas single.......Nos. 10—12
    —Corollas double..........No. 13

1 R. villòsus Ait. *High Blackberry.* Pubescent, viscid, and prickly; st. recurved at top, angular; lfts. 3—5, ovate, acuminate, serrate; petioles prickly; calyx acuminate; raceme leafless, ∞-flowered; fruit ovoid, small-grained, sweet. Thickets. 3—6f. Fruit black, in August.

β. ***frondosus.*** *Lawton B.* Smoothish; rac. leafy at base, short; fr. subglobous, large-grained, very acid. Fields and gardens.

γ. ***humifusus.*** Trailing; leaves smaller; peduncles few-flowered.

2 **R. cuneifòlius** Ph. *Sand B.* Pubescent; lvs. 3-foliate; lfts. wedge-obovate. entire at base, dentate above; racemes few-flowered. loose. Sandy woods, L. I. to Fla. 2—3f. Pet. white, thrice longer than calyx. May, June.

3 **R. híspidus** L. Hispid with retrorse bristles; lvs. 3-foliate, smooth, green both sides; lfts. obovate, thickish, persistent; fls. and fr. small, corymbed, on filiform pedicels. Damp woods. 3—7f long. Fruit sour. May, June.

β. ***setòsus.*** Lvs. oblanceolate; fruit red. (R. setosus Bw.)

4 **R. Canadénsis** L. *Northern Dewberry.* Slightly prickly; lvs. 3 (rarely 5)-foliate; lfts. elliptic or rhomb-oval, acuminate, thin; ped. long, hardly in clusters; fruit large, black, very sweet in August. Stony fields, North.

5 **R. triviàlis** Mx. *Southern Dewberry.* Prickly and bristly; lvs. 3-5-foliate, thick, ovate-oblong or oval; ped. 1-3-flowered; sep. obtuse, reflexed. South.

6 **R. odoràtus** L. *Mulberry.* St. erect or reclining, unarmed, glandular-pilous; lvs. palmately 3-5-lobed, middle lobe longest, unequally serrate; fls. large, in terminal corymbs; pet. orbicular, purple. Woods: common. 3—5f. Fr. red, sweet, in Aug.

7 **R. Nutkànus** Mocino. Somewhat pilous; lvs. broad, 5-lobed, lobes nearly equal, coarsely serrate; ped. few-flowered; sep. long-acuminate, shorter than the very large, round-oval, white petals. Mich., Wis. to Oreg. 5—7f.

8 **R. Chamæmòrus** L. *Cloudberry.* Herbaceous, diœcious; st. decumbent at base, erect, unarmed, 1-flwd.; lvs. mostly but 2, cordate reniform, rugous, with 5-rounded lobes, serrate; sep. obtuse; pet. obovate, white. White Mts. 1f. June.

9 **R. triflòrus** Rich. Branches herbaceous, green; lvs. 3- or 5-foliate; lfts. nearly smooth, thin, rhombic-ovate, acute, odd one petiolulate; stip. ovate, entire; pet. erect, oblong-obovate. Hilly woods, N. Fruit few-grained, dark red.

10 **R. strigòsus** Mx. *Wild Red Raspberry.* St. strongly hispid; lvs. pinnately 3- or 5-foliate; lfts. oblong-ovate or oval, obtuse at base, canescent-tomentous beneath, odd one stalked; cor. cup-shaped, white. Old fields, N. Common. Fruit red.

11 **R. occidentalis** L. *Black Raspberry. Thimble-berry.* St. glaucous with bloom, long, recurved, prickly; lvs. pinnately 3-foliate; lfts. ovate, acuminate, hoary-tomentous beneath, lateral ones sessile; pet. shorter than sep.; fr. blk. Rky. fields and gard.

12 **R.** IDÆUS. *Garden R.* Hispid or prickly; lvs. pinnately 3-5-foliate; lfts. rhomb-ovate, acuminate, hoary-tomentous beneath; sep. hoary-tomentous, pointed, longer than the white petals; fruit red, white, or yellow. § ? ‡

13 **R.** ROSÆFÒLIUS. *Bridal Rose.* Prickles straight; lvs. pinnately 3-7-foliate; lfts. lance-ovate, doubly serrate, velvety; flowers large, white. Mauritius.

8. **DALIBÁRDA,** L. FALSE VIOLET. Calyx inferior, deeply 5-6-parted, spreading, 3 of the segm. larger. Pet. 5. Sta. ∞. Sty. 5—8, long, deciduous. Ach. nearly dry. ⌊, Lvs. undivided. Scapes 1-2-flowered.

D. repens L. Low, pubescent, bearing creeping shoots; lvs. simple, roundish-cordate, crenate; stipule linear-setaceous; calyx spreading in flower, erect in fruit. ♃ Damp woods, Penn. to Can. 2—12′. Scapes with 1 small white flower. June.

9. **DRỲAS integrifolia,** Vahl.—On the White Hills of N. H. *Prof. Peck* (Pursh). On Pike's Peak, Colorado. (A. H. Thompson.)

10. **GEUM,** L. AVENS. Calyx 5-cleft, with 5 alternate segments or bractlets smaller and exterior. Pet. 5. Sta. ∞. Ach. ∞, aggregated

on a dry receptacle, and caudate with the persistent, mostly jointed, geniculate and bearded style. ♃ Leaves pinnately divided.

§ SIEVÉRSIA. Style straight, jointless, all of it persistent. Flowers large...Nos. 1, 2
§ GEUM *proper*. Style bent and jointed in the middle, upper part deciduous...(*a*)
a Head of fruits raised on a stipe. Flowers yellow or purple..........Nos. 3, 4
a Head of fruits sessile (no stipe).—*b* Flowers yellow..................Nos. 5, 6
—*b* Flowers white..................Nos. 7, 8

1 **G. triflòrum** Ph. Villous, erect, about 3-flowered; lvs. mostly radical, interruptedly pinnate, of numerous cuneate, incisely dentate, subequal lfts.; bractlets linear, longer than the sepals; styles plumous, very long in fruit (2—3′). N-W. States, rare in the North. 8—12′. Flowers purplish-white. May, June.

2. **G. radiàtum** Mx. Hirsute or smoothish; stem erect, nearly leafless; root lvs. lyrate, the terminal leaflet large, reniform, lobed and toothed, lateral ones minute; bractlets minute; pet. obcordate, yellow, large; styles hairy at base. White Mts. N. H., Roan Mt. N. Car. 9—15′. (G. Peckii Ph.)

3 **G. vernum** T. & G. Smoothish; lvs. pinnately divided, incisely lobed and toothed, the lowest often simple; fls. small, yellow; sep. reflexed; torus conspicuously stipitate. W. and S-W. 12—20′. Stipules large. April—June.

4 **G. rivàle** L. Pubescent; st. subsimple; radical lvs. lyrate; stip. ovate, acute; fls. nodding, purple; pet. as long as the erect cal. segments, purplish-yellow; upper joint of the persistent style plumous. Wet meadows, N. and M. 1—2f. June.

5 **G. strictum** Ait. Hirsute; lvs. interruptedly pinnate; lfts. ovate, lobed and toothed; pet. roundish, longer than the reflexed sepals; torus densely pubescent. Fields, N. States and Can. 2—3f. Terminal leaflet largest. July, August.

6 **G. macrophýllum** Willd. Hispid; lvs. interruptedly lyrate-pinnate, the terminal lft. much the largest, roundish cordate, 3—5′, all unequally dentate; petals longer than the calyx; recept. nearly smooth. White Mts. and Can. 1—2f. June, July.

7 **G. album** Gmel. Smoothish or pubescent; root lvs. ternate or often simple, upper lvs. simple; lfts. ovate, lobed and dentate; pet. as long as calyx; torus white-bristly. Thickets. Common. 2—3f. July. (G. Virginianum T. & G. &c.)

8 **G. Virginiànum** L. Hirsute; lvs. pinnate below, then ternate, the upper simple; lfts. incisely lobed, wedge-lanceolate, very acute, cut-toothed; pet. shorter than calyx; torus nearly naked. Wet thickets. 2—3f. Stout. July.

11. **FRAGÀRIA**, L. STRAWBERRY. Cal. concave, deeply 5-cleft, with an equal number of alternate, exterior segments or bractlets. Pet. 5, obcordate. Sta. ∞. Sty. ∞, lateral. Ach. smooth, affixed to a large, pulpy, deciduous receptacle. ♃ ⌊⌣ Stems stoloniferous. Leaves trifoliate. Fruit red. Flowers white, in Spring. Figs. 5, 117, 184, 251, 428.

§ Bractlets entire; petals white. Stemless, stoloniferous....................Nos. 1, 2
§ DUCHÉSNIA. Bractlets 3-lobed; petals yellow. Stems trailing................No. 3

1 **F. Virginiàna** Ehrh. Pubescent; lvs. thick; cal. of the fruit erect-spreading; ach. imbedded in pits in the globous receptacle; ped. commonly shorter than the lvs. Fields and gardens. 6—12′. Some of its varieties are polygamo-diœcious.

β. ***Illinoénsis.*** Larger, very villous in the stems. Prairies. Westward.

2 **F. vesca** L. *Alpine*, *Wood*, or *English Strawberry.* Villous-pubescent; cal. of the fruit spreading or reflexed; ach. superficial on the conical or hemispherical receptacle, which is without pits; lvs. thin. Fields and woods.

β. ***pállida.*** Fruit white. A var. well established in Wayne Co. N.Y. (Hankenson.)

3 **F. Indica** Ait. Pubescent, rooting at the joints; lfts. ovate, obtuse, incisely crenate-serrate; stip. lanceolate, free; pedicels axillary, solitary 1-flowered; bractlets leafy in fruit. ♃ Damp places, Penn. and S. § India.

12. WALDSTÉINIA, Willd. DRY STRAWBERRY. Cal. 5-cleft, with 5 alternate, sometimes minute and deciduous bractlets. Pet. 5 or more, sessile, deciduous. Sta. ∞. Sty. 2—6. Ach. few, dry, on a dry receptacle. ♃ Acaulescent, with lobed or divided leaves, and yellow flowers.

1 **W. fragarioìdes** Traut. Lvs. trifoliate; lfts. broad-cuneiform, incisely dentate-crenate, ciliate; scapes bracteate, many-flowered. Hilly woods. 8′. June.

2 **W. lobàta** T. & G. Lvs. simple, roundish, cordate, 3-5-lobed, incisely crenate; scapes filiform, bracted, 3-7-flowered. Hills, South. 6′. May, June.

13. POTENTÍLLA, L. CINQUEFOIL. Calyx concave, deeply 5-cleft, with 5 bractlets added. Pet. 5, roundish. Sta. ∞, slender. Ovaries collected into a head on a small, dry, hairy torus. Sty. terminal and lateral, deciduous. Achenia ∞. ① ♃ ♄ Leaves compound. Flowers solitary or cymous, mostly yellow. Figs. 365–6.

§ SIBBÁLDIA. Stamens 5. Achenia 5—10, styles lateral. Low herbs. Mts.....No. 1
§ CÓMARUM. Sta. ∞. Flowers brown-purple. Torus in fruit ovoid, spongy....No. 2
§ POTENTÍLLA *proper*. Sta. ∞. Flowers yellow to white. Torus not enlarged..(*a*)
a Leaves palmately 3-foliate..Nos. 3, 4, 5
a Leaves palmately 5-foliate. Flowers yellow..............................Nos. 6, 7
a Leaves pinnate.—*b* Shrubs, with the flowers axillary above...............No. 8
—*b* Herbs, with the flowers axillary, solitary..........Nos. 9, 10
—*b* Herbs, with the flowers in terminal cymes.......Nos. 11, 12
Exotic species, with fls. roseate and purple..Nos. 13, 14

1 **P. procúmbens** Clairv. Lfts. 3, obovate, 3-toothed at apex, hairy beneath; fls. corymbed. White Mts.? (Pursh), and N. (Sibbaldia L.)

2 **P. palústris** Scop. Lvs. pinnate; lfts. 3—7, lance-oblong, obtuse, sharply serrate, hoary beneath; sep. much longer than the purple petals; torus persistent, large, tasteless. ♃ Swamps, N. 1—2f. June. (Comarum L.)

3 **P. Norvégica** L. Hirsute; st. erect, dichotomous above; lfts. 3, elliptical or obovate, dentate-serrate, petiolulate; cymes leafy; cal. exceeding the emarginate pale-yellow petals; sty. terminal. ② Old fields, thickets, Can. to Car. 1—4f. July—Sept.

4 **P. tridentàta** Ait. Smooth; st. ascending, woody and creeping at base; lfts. 3, obovate-cuneate, evergreen, entire, with 3 large teeth at the apex; cymes nearly naked; petals white, obovate. ♃ High Mts. N. Eng. 6—12′. June.

5 **P. mínima** Haller? St. pubescent, ascending, mostly 1-flowered; lfts. 3, obovate, obtuse, incisely serrate with 5—9 teeth above; petals yellow, longer than the sepals. ♃ White Mountains. 1—3′, tufted. June, July.

6 **P. Canadénsis** L. Villous-pubescent, procumbent, producing runners: lfts. 5, obovate, cut-toothed above; pedicels axillary, solitary, 1-flowered.

α. pumila. Small and delicate, flowering in Apr. May, everywhere.

β. simplex. Subsimple, ascending, 8—14′, smoothish; fls. June—Aug. Common.

7 **P. argéntea** L. St. ascending, tomentous; lfts. 5, oblong-cuneiform, with a few, large, incised teeth, smooth above, silvery canescent beneath, sessile; flowers in a cymous corymb, small (3″). ♃ Rocky hills, N. 6—10′. June—Sept.

8 **P. fruticòsa** L. St. fruticous, very branching, hirsute, erect; lfts. 5—7, linear-oblong, all sessile, margin entire and revolute; petals large, much longer than the calyx. A low, bushy shrub, N. States. 1—2f. Flowers 1′. June—Aug.

9 **P. anserìna** L. *Silver-weed. Goose-grass.* St. slender, prostrate, rooting; lvs. interruptedly pinnate; lfts. many pairs, oblong, deeply serrate, canescent beneath; peduncle solitary, 1-flowered, very long. ♃ Wet, N. Eng. N. and W. 1—2f. Jn.—Sept.

10 **P. paradóxa** N. Decumbent at base, pubescent; lvs. pinnate; lfts. 7—9, ovate-obl. incised, upper ones confluent; ped. solitary, recurved in fruit; ach. 2-lobed. ① Shores of Sodus Bay (Hankenson), W. to Oreg. 1f. June—July.

11 P. Pennsylvánica L. Erect, whitish-downy; lfts. 5—9, oblong, obtuse, pinnatifid, upper ones larger; cyme fastigiate, at length loose. ♃ N. Eng.: rare.

12 P. argŭta Ph. Erect, grayish, pubescent and villous; radical lvs. on long petioles, 7-9-foliate, cauline few, 3-7-foliate; lfts. broadly ovate, cut-serrate, crowded; fls. in dense terminal cymes. ♃ By streams, N. and W. 2—3f, stout. May, June.

13 P. NEPALÉNSIS. Root lvs. quinate; stem ternate; lfts. wedge-oblong, serrate; stip. large, adnate, entire. ♃ Nepal. 1½f. Flowers large, rose, scarlet, orange, &c.

14 P. ATROSANGUÍNEA. Lvs. ternate; lfts. obovate, cut-serrate, white-downy beneath; sep. elliptic; pet. obcordate. ♃ Nepal. 1½f. Flowers crimson, often double.

14. ALCHEMÍLLA, L. LADIES' MANTLE. Calyx 4-toothed, with 4 external bractlets. Petals 0. Sta. 1—4. Carp. (1—4) mostly solitary, with the style lateral. Stig. capitate. Seed suspended. Low herbs, with palmately lobed or incised leaves and small green flowers. Fig. 38.

1 A. arvénsis Scop. *Parsley Piert.* Lvs. crenate at base, incisely 3-lobed or parted, the segm. 2-3-cleft, pubescent; fls. axillary. ① E. Va. A small weed. § Europe.

2 A. alpìnus L. Lvs. radical, silky beneath, 5-7-parted, cut-serrate at apex; fls. corymbed. High Mts. of N. Eng. (Pursh, 1816.) † Europe.

15. POTÈRIUM, L. BURNET. Calyx tube contracted at the top. Lobes 4, imbricated, petaloid, deciduous. Pet. 0. Sta. 4—∞, exserted. Styles slender, 1—3. Stig. penicillate. Ach. included in the hardened, 4-angled calyx tube. ♃ Lvs. unequally pinnate, with long stalks and adnate stipules. Lfts. petiolulate, serrate. Fls. in a spike or head, on a long peduncle or scape, often 8. (Includes Sanguisorba L.)

1 P. Canadénse (L.) Glabrous; lfts. many, ovate or oval, obtuse, cordate, with serrate stipels and stipules; spikes cylindric (3′); stam. 4, long exserted. Wet meadows along the mountains. Can. to Ga. 2—4f. Flowers green-white. Aug.

2 P. Sanguisórba L. Glabrous; leaflets many, ovate or roundish, deeply serrate; heads subglobous; sta. ∞, in the lower fls. L. Huron (*Hooker*) and W. Purp. † Aug.

16. AGRIMÒNIA, L. AGRIMONY. Calyx tube turbinate, contracted at the throat, muricate, limb 5-cleft, connivent in fruit. Pet. 5. Sta. 12—15. Ov. 2. Styles terminal. Ach. included in the indurated tube of the calyx. ♃ Lvs. pinnately divided. Fls. yellow, in long, slender racemes.

1 A. Eupatòria L. Lfts. 5 to 7, lance-oval or obovate, with small ones interposed, coarsely dentate; stip. large, dentate; pet. twice longer than the reflexed calyx. Dry soils, common. 1—3f. Rac. spicate, 6′—1f. Fls. 3—4″ broad. July, Aug.

2 A. parviflòra Ait. Lfts. 9—17, crowded, pubescent beneath, lanceolate, cut-serrate, with smaller ones interposed; pet. small. Woods, &c., Pa. S. and W. Plant fragrant, 3—4f, with spreading brownish hairs. July, Aug.

*β. **incisa.*** Lfts. incisely pinnatifid. South. (A. incisa T. & G.)

17. ROSA, Tourn. ROSE. Calyx tube urceolate, contracted at the orifice, lined with the fleshy disk. Petals 5 (greatly multiplied by cultivation). St. ∞, inserted into the rim of the disk. Ach. ∞, bony, hispid, borne free within the calyx tube. ♄ Prickly. Lvs. odd-pinnate. Stip. mostly adnate to the petiole. Figs. 35, 139, 197, 301.

Obs. Our innumerable varieties of garden Roses have mostly originated with the few species mentioned below. To define these varieties in order to their recognition would generally be impossible, for their forms are as evanescent as their names are arbitrary. All that we propose is to aid the learner in tracing back each form to the *species* whence it sprung. This will be easily done in all cases except with the hybrids.

* Wild Roses, with simple, 5-petalled flowers, open in June and July...(§)
§ Leaflets 3, rarely 5, smooth. Branches long, climbing or trailing..........Nos. 1, 2
§ Leaflets 5—9,—*a* rusty glandular and fragrant beneath....................Nos. 3, 4
—*a* not glandular. Erect.—*b* Prickles stout, falcate.............No. 5
—*b* Prickles weak, straight......Nos. 6, 7, 8
* Garden Roses, with either simple or double flowers...(§§)
§§ Styles cohering in an exserted column. Climbers...(*a*)
a Leaflets 3—5, mostly 3. Prickles stout, deflexed........................No. 1
a Leaflets 5—9.—*b* Stipules and sepals mostly entire...................Nos. 9, 10
—*b* Stipules, or sepals, dissected. Prickles slender ....Nos. 11, 12
§§ Styles separate.—*c* Stipules nearly free, and caducous................Nos. 2, 13, 14
—*c* Stipules adnate to the petiole.—*d* Prickles falcate...(*e*)
—*d* Prickles straight...(*f*)
e Leaflets not at all glandular. Shrubs erect, often slender.....Nos. 15, 16, 17
e Leaflets glandular and fragrant beneath, downy or not..... ...Nos. 3, 18, 19
f Lvs. and often the calyx, glandular. Fls. roseate or yellow..Nos. 20, 21
f Lvs. not at all glandular. Prickles numerous, weak, or 0..Nos. 22, 23, 24

1 **R. setígera** Mx. *Prairie Rose.* Spines strong, straightish; lfts. ovate; stip. adherent; fls. in corymbs, deep roseate, becoming pale, scentless; styles united in an exserted column. Prairies, &c., N. Y. W. and S. 12—20f. June, July. †
Var. *Prairie Queen*, *Baltimore Belle*, *Rosa Superba*, &c.

2 **R. lævigàta** Mx. *Cherokee R.* Prickles very strong, recurved; lfts. elliptical, evergreen, polished; stip. free, setaceous; fls. solitary, large, white; calyx bristly; styles separate. Tenn. to Fla. 15—30f. §? In hedges and gardens.

3 **R. rubiginòsa** L. *Sweet Brier. Eglantine.* Prickles strong, recurved, many weak ones intermixed; lfts. broad-oval; fls. solitary; fruit obovoid and, with the pedicels, glandular hispid. Fields, roadsides. 4—8f. Fls. light red, single or double.
Var. *Clementine*, *Maiden*, *Royal*, *Scarlet*, *Tree-double*, *White*, &c.

4 **R. micrántha** Smith. Prickles strong, recurved, few and equal; lfts. ovate; fls. solitary, small (15″), mostly white. Pastures, &c. N. Eng. 6—8f. June.

5 **R. Carolìna** L. *Swamp R.* Tall, erect, glabrous; lfts. elliptical, glaucous beneath, not shining; fls. corymbed; fr. depressed-globous, dark red, with hispid peduncles. Damp woods. 4—8f. Fls. varying from red to white. June, July.

6 **R. lùcida** Ehrh. *Wild R.* Prickles scattered, setaceous; lfts. elliptical, simply serrate, shining above; fls. in pairs (1—3); fr. depressed-globous and, with the pedicels, glandular-hispid. Dry woods. 1—3f. Branches greenish. Fls. red.

7 **R. nítida** Willd. *Wild R.* Stems reddish with very numerous reddish prickles; lfts. narrow-lanceolate, smooth and shining; fls. solitary; calyx hispid. Swamps, N. Eng. 1—2f. Fls. red. Fr. scarlet. Perhaps a variety of No. 6.

8 **R. blánda** Ait. *Thornless Wild R.* Prickles few, slender, deciduous; lfts. oblong, obtuse, not shining; stip. broad; ped. short, and with the calyx smooth and glaucous; fr. globous. Dry hills, N. and M. 2—3f. Petals reddish.

9 **R.** SEMPÉRVIRENS. Prickles subequal; lfts. thick, evergreen; fls. clustered, mostly white; fr. round-ovoid, yellow, glandular-hispid. S. Eur. 6—12f.

10 **R.** ARVÉNSIS. *Ayreshire R.* Prickles unequal, falcate; lfts. ovate, acute, deciduous, glaucous beneath; fls. solitary or clustered, white to purple. Eur. 20f.
Var. *Dundee Rambler*, *Virginia Lass*, *Weeping-tree R.*, &c.

11 **R.** MOSCHÀTA. *Musk R.* Lfts. lanceolate, acuminate; stip. very narrow; sep. long-appendaged, pinnatifid; fls. panicled, peculiarly fragrant, white. Asia. 10—12f.

12 **R.** MULTIFLÒRA. *Japan R.* Lfts. lance-ovate, rugous, soft; stip. pectinate-fringed; fls. corymbed; sep. short and ped. tomentous. South. 15—20f. Pet. wh. to purp. § †
Var. *Boursault*, *Seven Sisters*, *Russel's*, &c.

13 **R.** BRACTEÀTA. *Macartney R.* Erect; prickles recurved; lfts. 5—9, obovate, shining; stip. bristle-fringed; fls. solitary, with large bracts under the tomentous calyx. China. 2—3f. Fls. white, creamy, &c. § S.

14 R. BÁNKSIÆ. *Thornless R.* Prickles none; lfts. lanceolate, 3—5, subentire; fls. small, in umbels; fruit globular, nearly black. China.

15 R. INDICA. *Chinese Monthly R. Bengal R.* Lfts. 3—5, ovate, pointed, shining; stip. very narrow; sep. subentire; stam. inflexed; fruit top-shaped. China. 1—8f. Fls. white to crimson. April to November.

β. LAWRENCIÀNA. *Miss Lawrence's R.* Aculeate; fls. small (1′), pink-purple.

Other var. *Noisette*, *Youland of Aragon*, *Giant of Battles*, *Cloth of Gold* (sulphur-yellow), and the favorite *Tea Roses.*

16 R. CANÌNA. *Dog R.* Prickles strong, compressed; lfts. 5—9, with acute, incurved serratures; stip. rather broad, serrulate; sep. deflexed after flowering, deciduous; fr. ovoid, red. Eur. 4—8f. Fls. often simple, red.

β. BOURBONIÀNA. Lfts. ovate, subcordate, glossy; fls. double and semidouble, purple. Numerous subvarieties, everblooming.

17 R. CINNAMÒMEA. *Cinnamon R.* Lfts. 5—7, oval-oblong, grayish-downy beneath; stip. broad, involute, pointed; ped. and cal. glabrous; sep. as long as the petals, closed and persistent on the fruit. Eur. 6—12f. Purple.

18 R. DAMASCÈNA. *Damask R.* Prickles broad, unequal; lfts. large, broad-elliptic, whitish-downy; sep. reflexed. Levant. 3—4f. Fls. pale roseate, very fragrant. The common Monthly is a variety.

19 R. ALBA. *White R.* Erect, tall; prickles slender, or 0; lfts. round-ovate; petioles and veins downy, glandular; sep. pinnatifid; fr. ovoid. Eur. Stout, 4—8f. Flowers large, clustered, sweet-scented, pure white, semidouble.

20 R. CENTIFÒLIA. *Provens R. Cabbage R.* Very prickly; leaflets 5—7, ovate, edges gland.-ciliate; cal. and ped. gland.-hispid, viscid and frag. S. Eur. 2—4f. Fls. pink, &c.

Var. very numerous, among which is the incomparable *Moss Rose.*

21 R. EGLANTÈRIA. *Yellow R. Austrian Eglantine.* Branches red, all prickly; lfts. 5—7, small, broad-oval, or obovate; sep. smooth, entire; pet. large, yellow. Aust. 3f.

Var. The *Copper Austrian*, single; *Persian Yellow*, double, and others.

22 R. ALPÌNA. *Boursault R.* Climbing; lfts. 5—11, ovate or obovate, sharply serrate; ped. deflexed after flowering, and sep. connivent on the ovoid hip. Alps. 10—20f. Older stems thornless. Fls. clustered, pink, blush, crimson, &c.

23 R. GÁLLICA. *Common French R.* Erect; leaflets 5—7, oval to lanceolate, thick; fls. erect, with large spreading red petals; sep. ovate, some viscid. Eur. 2—5f.

Var. 300 or more; as the *Velvet*, *Carmine*, *Carnation.* Some are variegated, as *York-and-Lancaster*, *Tricolor*, *Picotée*, *Nosegay*, &c.

24 R. PIMPINELLIFOLIA. *Scotch R. Burnet R.* Very prickly, erect; lfts. 5—9, round-ovate, obtuse, smooth; sep. entire, finally convergent on the fruit; fls. small, roseate; but there are varieties with purple and even yellow flowers.

18. AMELÁNCHIER, Medic. SHAD-FLOWER. WILD SERVICE. Cal. 5-cleft. Pet. 5, oblong-obovate or oblanceolate. Sta. short. Sty. 5, somewhat united at base. Pome 3-5-celled, cells partially divided, 2-seeded. ♄ ♄ Leaves, simple, serrate. Flowers racemous, white.

A. Canadénsis T. & G. Lvs. oval or oblong-ovate, sharply serrate, smooth; raceme loose; calyx segments lance-triangular; fruit globous, purplish. Woods: common. 5—35f. Flowers showy, in early Spring. Fruit pleasant, ripe in June.

β. ***oblongifòlia.*** Shrub; lvs. oblong-oval, mucronate; pet. oblong-obovate.

γ. ***rotundifòlia.*** Lvs. broad-oval; pet. linear-oblong. Shrub 10—20f.

δ. ***alnifòlia.*** Lvs. round-oval, serrate near apex; pet. linear-oblong. 15—30f.

ε. ***oligocárpa.*** Shrub; lvs. elliptic-oblong, cuspidate; rac. 2-4-flowered. North.

19. CRATÆ̀GUS, L. THORN. HAWTHORN. Calyx urceolate, limb 5-cleft. Pet. 5. Sta. ∞. Ov. 1—5, with as many styles. Pome fleshy, containing 1—5 bony, 1-seeded carpels, and crowned at the summit by the persistent calyx and disk. ♄ ♄ Armed with thorns. Lvs. simple, often lobed. Bracts subulate, deciduous. Fls. corymbous, white or purplish.

§ Corymbs 6–30-flwd., appearing with the leaves. Fruit red or yellowish...(*a*)
a Villous or pubescent. Leaves plicate or sulcate along the veins.....Nos. 1, 2
a Pubescent. Leaves plain, not at all plicate, cleft or not.............Nos. 3, 4
a Glabrous throughout.—*b* Leaves abrupt at base, lobed, petioled.....Nos. 5—7
—*b* Leaves attenuate at base, seldom lobed...Nos. 8, 9
§ Corymbs 1–6-flowered,—*c* appearing before the downy leaves.................No. 10
—*c* appearing with the leaves,—*d* pubescent..........No. 11
—*d* glabrous........Nos. 12, 13

1 **C. tomentòsa** L. *Black Thorn.* Lvs. broad-ovate or oval, abrupt at base, doubly serrate or cut-lobed, villous beneath when young, and plicate; fls. large, in compound pubescent corymbs; fruit oval, large (8′′), 2–5-seeded, red. Can. to Ky. and Car. Mts. 15—25f. Flowers white, April, May. Fruit July, Aug. Varies greatly.

β. ***plicata.*** Lvs small, glabrous, strongly plicate. Vt., N. H., N. Y.

γ. ***pyrifòlia.*** Lvs. elliptic, acute at base, thinly pubescent. Styles 3. W.

δ. ***flabellàta.*** Lvs. fan-shaped; corymbs glandular-pubescent. W.

ε. ***mollis.*** Lvs. large, soft-villous, subcordate, many-lobed; corymbs canescently-villous; fruit downy when young. Ohio to Iowa.

2 **C. punctàta** Jacq. Lvs. cuneiform-obovate, doubly and often incisely serrate, entire at base, and narrowed to a short, winged petiole, veins straight and prominent, corymbs villous-downy; styles 3; fruit globous, punctate. Woods. 12—25f. April—June.

3 **C. arboréscens** Ell. Thornless; lvs. lanceolate, acute at each end, deeply serrate; calyx hairy; segments subulate, obtuse, entire; corymbs very numerous; styles 5; fruit ovoid, red, 3′′. Ga. Fla. and W. 20—30f. March, April.

4 **C. apiifòlia** Mx. Thorny. Lvs. deltoid, truncate at base, cut-lobed and toothed; petioles slender; styles 2 or 3. Woods, S. 8—12f. March, April.

5 **C. Oxyacántha** L. *Hawthorn.* Lvs. wedge-obovate, 3–5-lobed at apex; corymbs glabrous, white to purple; styles 1—3; fruit small, red. Hedges, &c. 8—18f. §

6 **C. coccínea** L. *White Thorn.* Lvs. broadly ovate, acutely serrate, 7–9-lobed (lobes shallow), thin, abrupt at base; petioles long, slender, and (with the calyx) subglandular; styles 3—5. Thickets: common. 10—20f. May.

7 **C. cordàta** Ait. *Washington Thorn.* Lvs. cordate-ovate, somewhat deltoid, incisely and often deeply 3–5-lobed, serrate, with long petioles; sep. short; sty. 5; fr. small, globous-depressed. Banks, Va. to Fla. 15—20f. ‡

8 **C. Crus-galli** L. *Cock-spur Thorn.* Lvs. obovate-cuneiform, tapering to a short petiole, serrate, coriaceous, shining above; spines very long; corymbs glabrous; sep. lanceolate, subserrate; styles 1 (2 or 3). Thickets. 10—20f. Fruit pyriform. June.

9 **C. spathulàta** Mx. Lvs. small, coriaceous, shining, oblong-spatulate, attenuated to the subsessile base, crenate above, sometimes lobed; corymbs numerous, lateral, 20–25-flowered; sepals very short; fruit very small, scarlet. South. 10—15f. June.

10 **C. æstivàlis** T. & G. *Apple Haw.* Young lvs. rust-downy, older smooth above, elliptic, repand, short-stalked; corymbs glabrous, 2–5-flowered; fruit large (8—9′′), globular, red. Wet shores, S. 20—30f. Fruit pleasant, in May.

11 **C. parviflòra** Ait. Thorns straight and slender; lvs. cuneate-obovate, subsessile; fls. subsolitary, villous-tomentous; sep. incised, leafy, as long as the petals; sty. 5; fr. large, roundish, yellowish. Sandy woods, N. J. and S. 4—7f. April, May.

12 **C. flava** Ait. *Summer Haw.* Thorns straight or arcuate; lvs. rhombic-obovate, attenuate into a glandular petiole; corymbs 1 (often 2 or 3)-flowered; styles 4 or 5; fruit large, pear-shaped. Va. to Fla. 15—25f. April, May.

13 **C. víridis** L. Thorns few and short; lvs. roundish or oval, acute at each end, sharply and doubly toothed above; petioles glandless; corymbs 3–6-flowered; styles 2 or 3; fruit large, globular. Iowa to Fla. 12—18f. April, May.

20. PYRUS, L. PEAR, APPLE, &c. Calyx urceolate, limb 5-cleft. Pet. 5, roundish. Styles 5 (2 or 3), often united at base. Pome closed, 2–5-carpelled, fleshy or baccate. Carp. cartilaginous, 2-seeded. ♄ ♄ Lvs. simple or pinnate. Flowers white or rose-colored, in cymous corymbs.

§ PYRUS. Leaves simple, glandless. Styles distinct. Pome pyriform..............No. 1
§ MALUS. Leaves simple, glandless. Styles united below. Pome globous...Nos. 2—4
§ ARÒNIA. Leaves simple, glandular on the midvein. Styles united, &c..........No. 5
§ SORBUS. Leaves pinnate. Styles 2—5, distinct. Pome small (scarlet).......Nos. 6, 7

1 **P.** COMMÙNIS. *Pear-tree.* Lvs. ovate-lanceolate, obscurely crenate, glabrous and polished above, acute or acuminate; corymbs racemous; cal. and pedicels pubescent: styles 5, distinct and villous at base. Europe. 20—35f.

2 **P.** MALUS. *Common Apple-tree.* Lvs. ovate or oblong-ovate, serrate, not lobed, downy, the veins all incurved; corymbs subumbellate; pet. with short claws; styles 5, united and villous at base. Europe. 20—30f. Nearly §.

3 **P. coronària** L. *Wild Crab-tree.* Lvs. ovate, rounded at base, cut-serrate, often sublobate, straight-veined, soon smoothish; sep. subulate; fls. large, roseate, corymbed, fragrant; pome large (18″), sour. Glades. 10—20f. May.

4 **P. angustifòlia** Ait. Lvs. lanceolate, often acute at base, crenate-serrate or subentire, short-stalked; sep. ovate; styles distinct. Pa. and S. 20—30f. March.

5 **P. arbutifòlia** L. *f.* *Choke Berry.* Downy; lvs. oblong or obovate, crenate-serrulate, narrowed at base into a short petiole; fruit pyriform or subglobous, dark red. Damp woods. 5—8f. Fruit size of currants. May, June.

β. ***melanocarpa.*** Nearly smooth; fruit blackish purple. Swamps. 2—4f.

6 **P. Americàna** DC. *Mountain Ash.* Lfts. oblong-lanceolate, acuminate, mucronately serrate, smooth, subsessile; cymes compound, with numerous flowers; pome small, globous; styles 3—5. Mountain woods, Can. to Ga. 15—20f. May. †

7 **P.** AUCUPARIA. *English Mountain Ash.* Lfts. as in P. Americana, except that they are always smooth on both sides, and, with the serratures, less acute at apex; flowers corymbous; fruit globous. Europe. 20—40f. †

21. CYDÒNIA, Tourn. QUINCE. Flowers and leaves as in Pyrus. Carpels cartilaginous, many-seeded. Seeds covered with mucilaginous pulp. ♄ ♄ Flowers mostly solitary.

1 **C.** VULGÀRIS. Lvs. oblong-ovate, obtuse at base, acute at apex, very entire, smooth above, tomentous beneath; fls. solitary, large, roseate; pome tomentous, obovoid. Europe. 8—12f. Stems crooked. April, May.

2 **C.** JAPÒNICA. *Japan Quince.* Lvs. glabrous, shining, coriaceous, ovate-lanceolate, acute at each end, serrulate; stip. reniform; spines short, straight; fls. axillary, subsessile, crimson. Japan. 5—6f. Very bushy. April, May.

ORDER XLV. SAXIFRAGACEÆ. SAXIFRAGES.

Herbs or *shrubs.* *Leaves* alternate or opposite, sometimes stipulate. *Sepals* 4 or 5, cohering more or less, and partly or wholly adherent. *Petals* as many as the sepals, inserted between the lobes of the calyx. *Stamens* as many as the petals, and alternate with them, or 2 to 10 times as many. *Ovary* mostly inferior, usually of 2 (2—4) carpels cohering at base and distinct or united above. *Fruit* generally capsular, 1–2-celled. *Seeds* small, many, albuminous. Figs. 25, 52, 53, 132, 250, 273

A large order, now including Ribes and Parnassia, each often regarded as constituting separate orders.

I. SAXIFRAGEÆ. Herbs. Stipules none or adnate. Petals imbricate, rarely convolute in the bud. Calyx free or partly adherent...(*a*)
a Petals wanting. Ovary adherent, 1-celled. Stamens 10....................CHRYSOSPLENIUM. 1
a Petals pinnatifid. Ovary half adherent, 1-celled. Stamens 5 or 10...........MITELLA. 2
a Petals entire.—*d* Stam. 10.—*e* Ovary 1-celled, nearly free....................TIARELLA. 3
—*e* Ovary 2-celled. Fls. perfect. Lvs. simple.....SAXIFRAGA. 4
—*e* Ovary 2-celled. Fls. polyg. Lvs. compound...ASTILBE. 5
—*d* Stam. 5.—*f* Ovary 2-celled, adherent. Seed rough.........BOYKINIA. 6
—*f* Ovary 2-celled, free. Seed wing-margined....SULLIVANTIA. 7
—*f* Ovary 1-celled.—*g* Styles and carpels 2.......HEUCHERA. 8
—*g* Styles and carpels 3.......LEPUROPETALON. 9
—*g* Stigmas and carpels 4......PARNASSIA. 10
II. ESCALLONIEÆ. Shrubs with alternate leaves, no stipules, and a valvate corolla bud...(*b*)
b Calyx free from the 2-celled ovary. Stamens 5. Capsule ∞-seeded.........ITEA. 11
b Calyx adherent to the ovary. Stam. 5. Berry ∞-seeded. (From S. Am.).....ESCALLONIA. 12
III. HYDRANGEÆ. Shrubs with opposite, simple leaves, and no stipules...(*c*)
c Corolla valvate in the bud.—*h* Cymes radiate. Shrub erect....................HYDRANGEA. 13
—*h* Cymes naked. Shrub climbing..................DECUMARIA. 14
c Corolla convolute in the bud.—*k* Stamens 20—40 Petals 4...................PHILADELPHUS. 15
—*k* Stamens 10. Petals 5. (Asiatic)............DEUTZIA. 16
IV. RIBESIEÆ. Shrubs with alternate, palmately-lobed leaves, and baccate fr...RIBES. 17

1. CHRYSOSPLÈNIUM, Tourn. WATER CARPET. Calyx adnate to the ovary, 4–5-lobed, colored inside. Cor. 0. Sta. 8—10, short. Sty. 2. Caps. obcordate, 1-celled, 2-valved, many-seeded. ≋ Prostrate, small.

C. Americànum Schw. Lvs. opposite, roundish, slightly crenate, tapering to the petiole; cal. 4-cleft. Cool springs, Northward. 3—6′. Calyx yellowish. Apr. May.

2. MITÉLLA, Tourn. MITRE-WORT. Calyx 5-cleft, adherent to the base of the ovary. Pet. 5, pectinately pinnatifid, inserted on the throat of the calyx. Sta. 5 or 10, included. Sty. 2, short. Caps. 2-beaked, 1-celled, with two equal valves. ♃ Flowers small, in a slender raceme or spike.

1 **M. diphýlla** L. Lvs. cordate, acute, sublobate, serrate-dentate, radical ones on long petioles, the cauline 2, opposite, subsessile; fls. white, in a long, loose spike. Woods, N. Eng. to Car. 1f. May, June. Curious.

2 **M. nuda** L. Lvs. orbicular-reniform, doubly crenate, with scattered hairs above; scape filiform, few-flwd., naked or with a single leaf; pet. pinnatifid with filiform segments. Damp woods, N. Eng. N. Y.: rare. 6′. Very delicate. June.

3. TIARÉLLA, L. BISHOP'S CAP. Calyx 5-parted, the lobes obtuse. Pet. 5, entire, the claws inserted on the calyx. Sta. 10, exserted, inserted into the calyx. Sty. 2. Caps. 1-celled, 2-valved, one valve much larger. ♃ Flowers white.

T. cordifòlia L. Lvs. cordate, acutely lobed, mucronate-dentate, pilous; scape racemous; stolons creeping. Rocky woods, Can. to Ga. Common North. 1f.

4. SAXÍFRAGA, L. SAXIFRAGE. Sep. 5, more or less united, often adnate to the base of the ovary. Pet. 5, entire, inserted on the tube of the calyx. Sta. 10. Anth. 2-celled, with longitudinal dehiscence. Caps. of 2 connate carpels, opening between the 2 diverging, acuminate beaks (styles). Seeds ∞. ♃

§ Leaves opposite (small) on the prostrate stem. Flowers purplish.............No. 1
§ Leaves alternate on the ascending stem. Flowers yellow or white... ..Nos. 2, 3, 4
§ Leaves rosulate at the base of the mostly leafless scape...(*a*)

a Calyx entirely free from the ovary (inferior)......................Nos. 5, 6, 7
a Calyx adherent to the base of the ovary (half superior)..........Nos. 8, 9, 10
Exotic species, cultivated..............Nos. 11, 12

1 **S. oppositifòlia** L. Lvs. opposite, obovate, carinate, obtuse, punctate, persistent; fls. solitary; cal. free; pet. large, obovate, 5-veined, longer than the stamens. Rocky cliffs, Willoughby Lake, Vt. June.

2 **S. aizoìdes** L. Cæspitous, leafy; lvs. linear-oblong, thick, flat; sep. ovate, slightly adherent; pet. oblong, yellow, longer than the sepals; capsules as long as the styles. With No. 1, and N. W. June.

3 **S. rivulàris** L. St. weak, ascending, 3–5-flowered; radical lvs. petiolate, reniform, crenately lobed, cauline lanceolate, subentire; cal. lobes broad-ovate, nearly as long as the white, ovate petals. White Mts. and N.

4 **S. tricuspidàta** Retz. St. thick, erect; lower lvs. crowded, oblong, 3-cuspidate; fls. few, large, somewhat corymbed; sep. thick, ovate, shorter than the oblong-obovate, yellow, dotted petals. Lake shores, Can. and N.

5 **S. leucanthemifòlia** Mx. Viscid-pubescent; lvs. radical, spatulate, cut-dentate, tapering to a petiole; scape diffusely paniculate; calyx free, reflexed; pet. unequal, white, 3 of them spotted. Mts. S. 18′.

6 **S. eròsa** Ph. Viscid-pubescent; lvs. radical, thin, oblong-lanceolate, acute, with erose teeth; panicle oblong, loose, with leafy bracts; cal. free, with reflexed, obtuse sepals as long as the equal, obtuse white petals. Mts. Pa. to Car. 15′.

7 **S. Careyàna** Gr. Lvs. round-ovate to deltoid, coarsely dentate, abrupt at base; panicle diffuse; pet. equal, ovate or oblong, white, dotted, twice longer than the recurved sepals. Mts. S. (and S. Caroliniana Gray).

8 **S. aìzoon** Jacq. Lvs. spatulate, obtuse, bordered with white cartilaginous teeth, and a marginal row of impressed dots; flowers corymbous paniculate; pet. obovate, white. Rocky shores, N. Ver. to Mich. and N. 5—10′. July.

9 **S. Virginiénsis** Mx. *Early Saxifrage.* Lvs. spatulate obovate, crenately toothed, shorter than the broad petiole; scape nearly leafless, paniculately branched; petals white, oblong, much exceeding the calyx. Rocks, common. 4—12′. April, May.

10 **S. Pennsylvánica** L. Lvs. oblong-lanceolate, rather acute, tapering at base, denticulate; scape forming a diffuse panicle; fls. pedicellate; pet. greenish, linear-lanceolate, but little longer than the cal. Wet meadows, N. Eng. to O. 1—2f. May, Jn.

11 **S.** sarmentòsa. With creeping runners; leaves roundish; pet. white, 2 longer than the other 3; scapes naked; plant hairy. China. Pretty for baskets.

12 **S.** crassifòlia. No runners; lvs. thick, oval; sc. naked; fls. pk. Siberia. Jn. Jl.

5. **ASTÍLBE,** Don. ♂ ☿ ♀ Calyx obconic, with 4 or 5 erect segments. Pet. 4 or 5, spatulate. St. 8 or 10, exserted. Ov. 2-celled. Carpels in fr. separating and dehiscing lengthwise inside. Seeds 1—4 in each cell. ♃ Coarse, weed-like plants. Leaves bi- or tri-ternate. Fls. small, yellowish-white, in spicate rac. forming a compound panicle (like Spiræa Aruncus).

A. decándra Don. St. tall, angular; lfts. subcordate, incisely lobed, mucronate-serrate; sterile flowers mostly apatelous; sta. 10. Mts. South. 4—6f. June—August.

6. **BOYKÍNIA,** Nutt. Calyx turbinate, adherent, 5-cleft. Pet. 5, deciduous. Sta. 5. Ov. 2-celled, 2-beaked. Capsule invested with the calyx, dehiscent between the beaks. ♃ Lvs. alternate, petiolate, palmate. Fls. cymous, white.

B. aconitifòlia Nutt. St. viscid-glandular; lvs. smoothish, deeply 5–7-lobed (lik those of Aconitum); cyme fastigiate, the fls. secund. Mts. S. 1—2f. July.

7. **SULLIVÁNTIA,** T. & G. Calyx adherent to the base of the ovar

Segm. ovate, acute. Pet. oval-spatulate, twice as long as the calyx. Sta. 5, shorter than the calyx. Capsule 2-beaked, 2-celled. Seeds wing-margined. ♃ Lvs. mostly radical, palmate-veined. Fls. in a loose pan., small, wh.

S. Ohiònis T. & G.—Ohio, Wisc. Stem weak, ascending, 6—12′. Lvs. roundish, cordate, lobed and toothed. May, June.

8. **HEÙCHERA,** L. ALUM ROOT. Calyx of 5 obtuse segm. Cor. of 5 small, entire petals, inserted with the 5 stamens on the throat of the calyx. Cap. 1-celled, 2-beaked, dehiscent between the beaks. Seeds many, with a rough, close testa. ♃ Lvs. radical, long-petioled, petioles with adnate stipules at base.

§ Fls. small (1—2″ long), regular; stamens and style much exserted.........Nos. 1—3
§ Fls. larger (3—5″ long), oblique; stamens and style short...................Nos. 4, 5

1 **H. Americàna** Willd. Viscid-pubescent; leaves roundish, cordate, somewhat 7-lobed; pan. elongated, loose, divaricate; cal. obtuse, short, about equalling the spatulate petals; stam. much exserted. Shades, W. and S., rare N. 2—4f. May, June.

2 **H. villòsa** Mx. Villous, with rusty, spreading hairs; radical lvs. round-cordate, thin, glabrous above, 7-9-lobed; pan. loose, filiform; pet. white, about as long and narrow as the filaments. Mts. Md. to N. Car. and Ky. 1—3f. June, July.

3 **H. caulèscens** Ph. Smooth or nearly so; lvs. 5-7-lobed, dentate; pan. loose, slender; scape bearing one or two leaves below; pet. linear-spatulate, twice longer than the calyx. Mts. Car. Tenn. Ky. 1—2f. (H. Curtisii Gr.)

4 **H. pubèscens** Ph. Lvs. glabrous, round-cordate, 7-9-lobed; panicle dichotomous, geniculate; style exserted, stam. included; pet. white. Mts. Middle States.

5 **H. hìspida** Ph. Lvs. hispid-rough, 5-7-lobed, lobes very obtuse; fls. scattered; pet. spatulate, purple; sta. a little exserted. Mts. S. and prairies W. June.

9 **LEPUROPÉTALON,** Ell. Calyx 5-parted, lobes obtuse, tube turbinate, adherent to the base of the 3-carpelled ovary. Petals 5, minute, spatulate, persistent. Sta. 5, short. Capsule globous, 1-celled, 3-valved, many-seeded. Placentæ opposite the stigmas. ① A minute, succulent herb, growing in tufts. Lvs. entire, dotted. Fls. terminal.

L. spatulàtum Ell.—Hard soils S. Stems scarcely 1′; leaves spatulate, veinless; fls. large in proportion, white. March, April.

10. **PARNÁSSIA,** Tourn. GRASS OF PARNASSUS. Sep. 5, united at base, persistent. Pet. 5, persistent, with a bundle of sterile fil. at the base of each, and 5 perfect stamens alternating. Caps. 1-celled, 4-valved. Placentæ opposite the stigmas, in the middle of each valve. Seeds winged ♃ Glabrous. Lvs. radical. Scape 1-flowered, often with one sessile leaf. Pet. white, with green veins.

1 **P. Caroliniàna** L. Sterile filaments 3 in each group, each with a little round head; pet. sessile; lvs. broad-oval, rounded at base, one sessile on the scape. Wet meadows. 10—15′. Flower handsome, 1′ broad. June—August.

2 **P. asarifòlia** Vent. Sterile fil. 3 in each set; pet. abruptly clawed; lvs. reniform. Mts. Va. and Car. 10′. Lvs. large (1—2′).

3 **P. palustris** L. Sterile fil. pellucid, setaceous, 9—15 in each set; cauline leaf, if any, sessile; radical lvs. all cordate. Bogs, Mich. N. and W. 6′. Fls. 1′. August.

11. **ÌTEA,** L. Calyx small, with 5 subulate segm. Pet. 5, lance-linear, inflexed, inserted with the 5 stam. on the calyx. Styles united. Caps. 2-

celled, 2-furrowed, 8–12-seeded. ♄ With alternate, simple leaves, and a simple, spicate, terminal raceme of white flowers.

I. Virgínica L.—Swamps, Pa. to Fla. 6f. Lvs. oval, acuminate, short-stalked. May, Jn.

12. ESCALLÒNIA RUBRA and E. GLANDULOSA are handsome shrubs, with evergreen leaves and scarlet flowers, prized in the greenhouse. S. Am.

13. HYDRÁNGEA, L. HYDRANGEA. Marginal fls. sterile, neutral—an enlarged, rotate 5-lobed, colored calyx only. ☿ Calyx tube hemispherical, adherent. Limb 4–5-toothed, persistent. Pet. ovate, sessile. Stamens twice as many as the petals. Caps. 2-beaked, opening between the beaks. Seeds ∞. ♄ With opposite leaves. Fls. cymous, generally radiant.

§ Cymes paniculate. Lvs. sinuate-lobed. Fls. rose-white......................No. 1
§ Cymes corymbous, level-topped. Leaves undivided......................Nos. 2, 3, 4

1 **H. quercifòlia** Bartram. Lvs. deeply sinuate-lobed, dentate, tomentous beneath, and on the petioles and veins above; cymes paniculate, radiant, the sterile fls. very large and numerous. Shady banks, S. 4—8f. A superb plant. †

2 **H. arboréscens** L. Lvs. ovate, obtuse or cordate at base, acuminate, serrate-dentate, paler beneath, nearly smooth; fls. white-red. Banks, S. and W. 5—6f.

3 **H. radiàta** Walt. Lvs. ovate, abrupt or cordate at base, acuminate, serrate, silvery-tomentous beneath; fls. white. Uplands, S. 6—8f.

4 **H.** HORTÉNSIS L. *Changeable Hydrangea.* Lvs. elliptical, narrowed at each end, dentate-serrate, strongly veined, smooth. China? 1—3f. In cultivation the fls. are generally *all* neutral, of varying hues, white, blue, pink, &c.

14. DECUMÀRIA, L. Calyx 7–10-toothed, tube adherent to the 5–10-celled ovary. Pet. as many as calyx teeth, valvate in the bud. Sta. 3 times as many as the petals, in one row. Stig. radiate. Caps. many-ribbed, crowned with the style, ∞-seeded. ♄ With rootlets, opposite leaves and cymes of white, fragrant flowers.

D. bárbara L.—A beautiful climber, in damp woods, S. 15—30f.

15. PHILADÉLPHUS, L. FALSE SYRINGA. Calyx 4–5-parted, half superior, persistent. Cor. 4–5-petalled. Sty. 4-cleft. Sta. 20—40, shorter than the petals. Caps. 4-celled, 4-valved, with loculicidal dehiscence. Sds. many, arilled. ♄ Handsome. Leaves opposite, exstipulate.

1 **P. inodòrus** L. Lvs. ovate, acute or pointed, 3 (rarely 5)-veined, smooth, entire or with remote slender teeth; calyx lobes ovate, acute, as long as the tube; styles united; fls. scentless, 1 or several together, pure white, 1′. Uplands, S. 5—8f. May–Jl.
  β. ***grandiflòrus.*** Pubescent; flowers larger (1½′); sepals acuminate. Cultivated.
  γ. ***hirsùtus.*** Hairy; leaves and flowers smaller, the latter 7″. Mt. woods.

2 **P.** CORONÀRIUS. *Mock Orange.* Glabrous; lvs. ovate, remotely serrate above, 5–7-veined; flowers in dense clusters, cream-white, very fragrant; styles separate. S. Europe. 5—8f. June, July.

16. DEÚTZIA, Thunb. Pet. 5, valvate or imbricate in bud. Sta. 10, the alternate longer, fil. dilated, 3-toothed, middle tooth antheriferous. Ov. inferior. Caps. 3–5-celled. ♄ Leaves opposite. Fls. numerous, white.

1 **D.** SCABRA. Lvs. ovate, acute, serrate, rough-hairy; racemes terminal, dense; styles 3; flowers bell-shaped. Japan. 5—8f. Very fragrant. June.

2 **D.** GRÁCILIS. Foliage similar to the other, but smoother. Shrub only 2—3f, branches covered with flowers in June.

17. RIBES, L. CURRANTS. Calyx tube ovoid, adherent to the one-celled ovary, limb tubular or bell-shaped, 4-5-cleft. Pet. 4—5, small, inserted with the 4—5 stamens on the top of the calyx tube. Sty. 2. Berry filled with pulp, with 2 parietal placentæ. Seeds ∞, albuminous. ♄ ♄ Leaves alternate, palmately lobed. 3—6f.

§ RIBÉSIA. *Currants.* Stems and berries not prickly. Flowers in racemes...(*a*)
a Flowers greenish or red. Lvs. plicate in the bud.—*b* Fruit smooth....Nos. 1, 2, 3
—*b* Fruit hairy......Nos. 4, 5, 6
a Flowers bright yellow. Leaves convolute in the bud..............................No. 7
§ GROSSULÀRIA. *Gooseberries.* Stems spinescent. Leaves plicate...(*c*)
c Peduncles 5-8-flowered. Style 2-cleft. Berries small, hispid..................No. 8
c Peduncles 1-3-flowered.—*d* Calyx tube and fruit prickly..................Nos. 9, 10
—*d* Fruit smooth.—*e* Leaves cordate at base........No. 11
—*e* Leaves not cordate....Nos. 12, 13, 14

1 **R. rubrum** L. *Common Red C.* Lvs. obtusely 3-5-lobed, pubescent beneath, subcordate; rac. smoothish, pendulous; calyx limb rotate; bracts short; fr. globous, glabrous, red, rarely amber. Woods, Vt. Wisc. †

2 **R. flòridum** L'Her. *Wild Black C.* Lvs. acutely 3-5-lobed, resinous-dotted, subcordate; rac. pubescent, pendulous; cal. cylindrical; bracts long; fruit obovoid, smooth, black. Copses, Can. to Ky. 3—4f. May, June.

3 **R.** NIGRUM. *Black C.* Lvs. 3-5-lobed, resinous-dotted beneath, not cordate; rac. lax, hairy; calyx bell-shaped; fruit roundish, black. Eur. 4—5f.

4 **R.** SANGUÍNEUM. Lvs. 3-5-lobed, white-downy beneath, cordate; rac. long, lax, all rose-red; calyx segments spreading; styles united; fruit blue. Oregon.

5 **R. prostràtum** L'Her. *Mountain C.* Stems reclined; lvs. 5-7-lobed, rugous, cordate; rac. erect, lax; cal. rotate; berries globous, glandular-hispid, red, ill-scented. Rocks, N. Eng. to Car. Raceme becoming erect. May.

6 **R. resinòsum** Ph. Clothed with resinous-glandular hairs; lvs. 3-5-lobed, roundish; raceme erect; calyx spreading. Mts. Car. (Lost.)

7 **R.** AÙREUM Ph. Glabrous; lvs. 3-lobed, subentire, shorter than their stalks; raceme lax; calyx limb tubular, longer than the pedicels; fruit oval, yellow, soon brown. Mo. to Oreg. 6—10f. Flowers fragrant.

8 **R. lacùstre** Poir. Spiny and prickly; lvs. deeply 3-5-lobed and incised, cordate; raceme hairy; style 2-cleft; fruit hispid. Swamps, Northward.

9 **R. Cynòsbati** L. *Prickly G.* Spines in pairs, prickles few or none; lvs. cordate, lobed, pubescent, cut-dentate; styles united to the top; fruit brown-purple, with long spines, eatable. Thickets, Northward. May.

10 **R.** SPECIÒSUM. Glabrous; lvs. roundish, lobed, crenate, polished; spines long, in 3's; flowers nearly solitary, pendulous, scarlet. California. Very handsome.

11 **R. hirtéllum** Mx. Spines few and short, prickles 0; lvs. roundish, lobed, toothed; calyx limb bell-shaped, lobes twice longer than the petals; stamens exserted; style 2-cleft. Rocky woods, N. Eng. to Wisc. Fruit purple.

12 **R. rotundifòlium** Mx. Spines few and short; prickles few or 0; lvs. roundish, lobed, cut-crenate-dentate, smooth or downy; calyx lobes linear, reflexed; stamens and styles much exserted. Rocky woods. May.

13 **R.** UVA-CRISPA. *English G.* Spiny; lvs. roundish, short-stalked, hairy beneath; peduncle hairy, 1-flowered; fruit oval or globous, large (8—12″), red, green, amber, white, &c. Europe.

ORDER XLVI. CRASSULACEÆ. HOUSE-LEEKS.

Plants herbaceous or shrubby, succulent. *Leaves* entire or pinnatifid. *Stipules* 0. *Flowers* sessile, usually in cymes and perfectly symmetrical.

Sepals 3—20, more or less united at base, persistent. *Petals* as many as the sepals. *Stamens* as many as the petals, and alternating with them, or twice as many. *Ovaries* as many as the petals. *Filaments* distinct. *Anthers* 2-celled, bursting lengthwise. *Fruit* distinct follicles or a capsule, many-seeded. Figs. 8, 9, 468.

§ Carpels distinct, forming a circle of follicles...(*)
* Petals distinct.—*a* Flowers all 3- or 4-parted. Stamens 3 or 4....................TILLÆA. 1
—*a* Flowers 5-, or 4- and 5-parted. Stamens 8 or 10.............SEDUM. 2
—*a* Flowers all 5-parted. Stamens 5.............................CRASSULA. 3
—*a* Flowers 6–12-parted, with cleft hypogynous scales...........SEMPERVIVUM. 4
Petals united at base.—*b* Flowers 4-parted. Stamens 8..........................BRYOPHYLLUM. 5
—*b* Flowers 5-parted. Stamens 5...........................ROCHEA. 6
—*b* Flowers 5-parted. Stamens 10.........................ECHIEVERIA. 7
§ Carpels united into a many-seeded capsule...(*x*)
x Flowers 4-parted, with 8 stamens..DIAMORPHA. 8
x Flowers 5-parted, with 10 stamens. Petals often wanting...............PENTHORUM. 9

1. TILLÆ̀A, Mx. PIGMY-WEED. Calyx of 3 or 4 sepals united at base. Petals 3 or 4, equal. Sta. 3 or 4. Caps. 3 or 4, distinct, follicular, opening by the inner surface, 2- or many-seeded. ♒ Very small. Lvs. opposite.

T. simplex Nutt. St. ascending or erect, rooting at base; lvs. connate at base, linear-oblong, fleshy; flowers axillary, solitary, subsessile, their parts in 4's; pet. greenish; carpels 8–10-seeded. ① Muddy banks, Ct. to Md. 1—2′. July—Sep

2. SEDUM, L. STONE-CROP. Sep. 4 or 5, united at base. Pet. 4 or 5, distinct, spreading. Sta. 8—10. Carp. 4—5, distinct, many-seeded, with an entire scale at the base of each. ♃ Lvs. fleshy. Inflorescence cymous.

§ Fls. in scorpoid racemes or spikes, or axillary, the latter often 4-parted....Nos. 1—4
§ Fls. in corymbous cymes, all 5-parted.—*a* Leaves mostly alternate........Nos. 5—7
—*a* Leaves opposite, and whorled.......No. 8

1 **S. ternàtum** Mx. Leaves scattered, flat, obovate, the lower mostly in whorls of 3, the upper spatulate; spikes 3, rarely 2—4, radiating, secund; central flower 5-parted, the rest 4-parted, white. Damp woods. 3—8′. May, June.

2 **S. Nèvii** Gr. Stem weak, branched, 3—5′; leaves alternate, imbricated, small, obovate-spatulate; petals lance-linear, white. Mts., Va. (Porter), and S. June, July.

3 **S. pulchéllum** Mx. Leaves linear, alternate, crowded; spikes radiating, dense flowered, secund, central flower 5-, the others 4-parted, rose-purple. Rocks, Va. to Tex. 4—12′. May—July. Very pretty in gardens.

4 **S. acre** L. *English Moss.* Procumbent, diffuse; leaves very small, fleshy, crowded, alternate, appressed; cyme leafy, somewhat trifid; fls. yellow. Gardens. Jl. § Eur.

5 **S. Rhodìola** DC. Stems clustered, erect, 5—10′; leaves mostly scattered, obovate, with several angular teeth or entire, crowded; flowers 4-parted, in a small cyme at top, yellowish, *diœcious.* Rocks, Penn. (Prof. Porter), Me., and Can.

6 **S. telephioìdes** Mx. Ascending, tall; lvs. round-oval to lance-oval, narrowed to the base, subdentate, alternate; pet. acuminate, pink. Rocks, Md., and S. Stems 1f, leaves 1—2′. Flowers numerous, in a terminal branching cyme. June.

7 **S. Telèphium** L. *Live-forever.* Clustered, erect, very leafy; lvs. oblong-ovate, obtuse, dent-serrate; corymb dense, leafy, blue-purple. Waste grounds, &c. Stems 1–2f, round, simple, with a compact pale-purple cyme at top. August. § Europe.

8 **S.** SIEBÓLDII. Lvs. opposite, or in 3's, roundish, glaucous, sessile; cymes dense, leafy;

fls. 5-parted, small, bluish-purple, blooming in October. Japan. In dense tufts. A pretty plant, and one of the last to flower in the garden. Like most of the Sedums, its severed stalks will grow even if suspended in air.

3. **CRÁSSULA,** Haw. Parts of the flower all in 5's, distinct and free. Scales at base of ovaries 5. ♄ ♃ Fleshy plants, from S. Africa, remarkable for the perfect symmetry of their flowers.

1 **C.** ARBORÉSCENS. Stem shrubby, terete, erect; lvs. opposite, fleshy, roundish, cuspidate, flattish, glaucous, dotted above; cyme 3-parted; flowers handsome, roseate.

2 **C.** LÁCTEA. Stem erect, twisted below, branched; lvs. ovate, narrowed to the connate bases, dotted along the margin; cyme panicled, with many white star-like flowers. Leaves bright green. From S. Africa, as are many other species.

4. **SEMPERVÌVUM,** L. LIVE-FOREVER. HOUSE-LEEK. Sep. 6—20, nearly distinct. Petals and pistils as many, and stamens twice as many. Scales lacerated. ♄ ♃ Leaves thick and fleshy, crowded.

S. TECTÒRUM. Lvs. oval-obovate, ciliate-fringed, densely packed at the ends of the offsets, scattered on the stems; flowers purplish, usually 12-parted. Europe. Will grow on walls and on the roofs of houses (*tectorum*), or in borders.

5. **BRYOPHÝLLUM** CALYCÌNUM. ♄ Evergreen, fleshy, 2f. Leaves opposite, 3–5-foliate, with thick, oval, crenate leaflets. Flowers in a loose, terminal panicle, with an inflated calyx and a tubular, exserted, purplish corolla, which has a 4-lobed limb. The plant is propagated from the leaves, which produce buds on their margins becoming new plants,—like ovules from a carpellary leaf.

6. **ROCHEA,** DC. Corolla funnel-form, 5-cleft. Sepals, stamens, ovaries, and hypogynous scales each 5. ♄ Fleshy. S. African.

1 **R.** FALCÀTA. Shrub 2f; leaves opposite, the pairs some united at base, glaucous, oblong, deflexed-falcate; flowers in corymbous cymes, red, open, fragrant.

2 **R.** COCCÍNEA. Leaves connate-sheathing, ovate-oblong; cymes scarlet. Beautiful.

7. **ECHIEVÈRIA,** DC. Corolla tubular to bell-form, 5-lobed or parted. Calyx 5-cleft. Stamens 10. Ovaries 5, with 5 scales. ♄ ♃ Fleshy.

1 **E.** GRANDIFÒLIA. Plant 2f, erect, glaucous with a bloom; lvs. spatulate to obovate, acute, the lowest large, rosulate; flowers urn-shaped, panicled, orange-red. From Mexico.

2 **E.** COCCÍNEA. Plant 2f, erect; leaves obovate-cuneate, acute, scattered; flowers carmine outside, yellow within, in a tall leafy spike. Mexico.

8. **DIAMÓRPHA,** N. Fls. 4-parted, with 8 stamens. Carp. 4, united below, at length spreading, opening by an irregular valve on the back, 4–8-seeded. ② Small, fleshy, tufted, with cymes of white or pink flowers.

D. pusílla N.—Sunny rocks, S. 1—3′. Leaves oval, sessile, 1″. March, April.

9. **PENTHÒRUM,** L. VIRGINIA STONE-CROP. Calyx of 5 sepals united at base. Pet. 5 or 0. Sta. 10. Caps. of 5 united carpels, 5-angled, 5-celled, 5-beaked, dehiscent by an obliquely-terminal valve. Seeds ∞, minute. ♃ Not succulent. Lvs. alternate. Fls. yellowish, cymous.

P. sedoìdes L. Stem branched and angular above; leaves nearly sessile, lanceolate, acute, serrate; fls. in secund, radiating racemes. Wet places. 10—16′. July—Sept.

ORDER XLVII. HAMAMELACEÆ. WITCH HAZELWORTS.

Shrubs or *trees* with alternate simple leaves and deciduous stipules. *Flowers* in heads or spikes, often ♂ ☿ ♀ or 8. *Calyx* adherent. *Petals* linear, or 0. *Stamens* twice as many as the petals, the opposite sterile and scale-like, or ∞. *Ovaries* of 2 carpels, 2-celled, 2-styled, *ovules* 2 or ∞. *Fruit* a woody capsule, 2-beaked, 2-celled, 1–2-seeded.

§ Petals 4. Calyx 4-lobed. Stamens 4. Flowers mostly ☿ ....HAMAMELIS. 1
§ Petals 0. Calyx truncate. Stamens 20—28. Flowers ☿ ....FOTHERGILLA. 2
§ Petals 0. Calyx 0. Stamens ∞. Flowers 8, in globular heads..........................LIQUIDAMBAR. 3

1. HAMAMÈLIS, L. WITCH HAZEL. Calyx with an involucel of 2—3 bracts at base. Pet. very long, linear. Sterile stamens scale-like, opposite the petals, alternating with the 4 fertile ones. Caps. nut-like, 2-celled, 2-beaked. ♄ ♄ Flowers yellow.

H. Virginiàna L. Lvs. oval or obovate, acuminate, crenate-dentate, obliquely cordate; fls. sessile, 3—4 together, blooming in late autumn and winter. Woods. Stems crooked, 10—15f. Pet. twisted, 9′′ long.

2. FOTHERGÍLLA, L. *filius.* Calyx campanulate, truncate and obscurely 5–7-toothed, bearing the stamens in one marginal row. Styles distinct. Caps. 2-lobed. ♄ Lvs. oval or obovate, expanding after the dense spikes of flowers.

F. alnifòlia L. *f.*—Swamps, Va. to Fla. 2—4f. Calyx white, fringed with the long white or pink filaments. Styles long, recurved. March, April.

3. LIQUIDÁMBAR, L. SWEET GUM TREE. Involucre 4-parted, deciduous. ♂ Ament conical. ♀ Ament globular. Calyx a scale, if any. Fruit a globular sorosis (§ 171), woody, consisting of the scales, and capsules which open between their beaks. Ovules ∞, 1 or 2 maturing. ♄ Leaves and gum fragrant. Twigs winged with corky bark.

L. styracíflua L. Lvs. palmate, with 5 acuminate, serrate lobes; veins villous at their bases. A large and handsome tree, Conn. to Ill. and S. 60f. May.

ORDER XLVIII. HALORAGEÆ. THE HIPPURIDS.

Herbs mostly aquatic, with incomplete or minute √—√ flowers. *Calyx tube* adherent. *Petals* 0—4. *Stamens* 1—8. *Pollen* 4-grained. *Ovary* 1–4-celled. *Styles* 1—4, distinct, one pendulous ovule in each cell. *Fruit* indehiscent, 1–4-celled, 1–4-seeded. *Seed* pendulous, anatropous, albuminous. (Formerly joined to Onagraceæ.)

* Flowers 3-parted, apetalous, perfect..........................PROSERPINACA. 1
* Flowers 4-parted, monœcious ; petals 4 or 0..........................MYRIOPHYLLUM. 2
* Flowers 1-parted, apetalous, perfect..........................HIPPURIS. 3

1. PROSERPINǍCA, L. MERMAID WEED. Calyx tube adherent to the ovary, 3-sided, limb 3-parted. Pet. none. Sta. 3. Stig. 3. Fruit 3-angled, 3-celled, bony, crowned with the calyx. ♒ Roots creeping. Lvs. alternate. Fls. greenish.

1 **P. palústris** L. Lvs. linear-lanceolate, sharply serrate above the water, those below (if any) pinnatifid. ♃ Swamps: common. 6—20′. Lvs. 1—2′. June, July.

2 **P. pectinàcea** Lam. Lvs. all pectinate, with linear-subulate segm.; fr. obtusely 3-angled. ♃ Sandy swamps, Ms. (rare) to Fla. 5—10′; long creepers at base. Jl. Aug.

2. **MYRIOPHÝLLUM**, Vaill. WATER MILFOIL. Flowers 8, or frequently ☿. Calyx 4-toothed in the ☿ and ♀ flowers, 4-parted in the ♂. Pet. 4, often inconspicuous or none. Sta. 4—8. Stig. 4, pubescent, sessile. Fr. of 4 nut-like carpels, cohering by their inner angles. ♒♃ Submersed lvs. parted into capillary segments. Upper fls. usually ♂, middles ones ☿, lower ♀, greenish, emerging in summer.

§ Stamens 8. Carpels smooth and even., Leaves whorled in 3's, rarely in 4's..Nos. 1, 2
§ Stamens 4.—Carpels ridged on the back. Leaves whorled in 4's and 5's....Nos. 3, 4
—Carpels smooth and even. Leaves alternate or wanting.... ..Nos. 5, 6

1 **M. spicàtum** L. Floral lvs. ovate, entire, shorter than the flowers, the rest all pinnately capillary; fls. in term. spikes. Deep waters, fls. emerging. 10f.

2 **M. verticillàtum** L. Floral lvs. pectinate-pinnatifid, much longer than the flowers, the lower pinnately-setaceous. Spikes leafy, terminal. Slow waters.

3 **M. heterophýllum** Mx. Floral lvs. ovate-lanceolate, serrate, longer than the fls. crowded, the rest pinnately or pectinately capillary. Ponds: rare.

4 **M. scabràtum** Mx. Floral lvs. linear, pectinately toothed; fr. roughened, sharply angled; verticils axillary. Shallow waters. 6—12′. Capillary segments few.

5 **M. tenéllum** Bw. Erect and almost leafless; floral leaves or bracts alternate, minute, entire, obtuse; fls. 8; petals linear. Water edges, N. Eng. N. Y. and N. Scapes 4—12′, from long creeping rhizomes. Fls. purplish-white, sessile.

6 **M. ambíguum** Nutt. Lvs. many, submersed ones pinnate, with capillary segments, middle ones pectinate, upper linear; fls. mostly ☿. Floating in ponds and ditches. Ms. to Ga.

β. ***limòsum.*** Small, procumbent, rooting, in muddy places; lvs. all linear.

γ. ***capillàceum.*** Very slender; lvs. all immersed and capillary, in ponds.

3. **HIPPÙRIS**, L. MARE'S TAIL. Calyx with a minute, entire limb crowning the ovary. Cor. 0. Sta. 1, inserted on the margin of the calyx. Anth. 2-lobed, compressed. Style 1, longer than the stamen, stigmatic the whole length. Seed 1. ♒♃ St. simple. Lvs. verticillate, entire. Fls. axillary, greenish.

H. vulgàris L. Lvs. in verticils of 8 to 12, linear, acute, smooth, entire; fls. solitary, minute. Borders of ponds, marshes. N. and W.: rare. 1—2f. Dakotah (Matthews)

ORDER LI. MYRTACEÆ. MYRTLEBLOOMS.

Trees and *shrubs*, without stipules. *Leaves* opposite, entire, punctate, usually with a vein running close to the margin. *Calyx* adherent below to the compound ovary, the limb 4- or 5-cleft, valvate. *Petals* as many as the segments of the calyx. *Stamens* numerous. *Anthers* introrse. *Style* and *stigma* simple. *Fruit* with many seeds. *Albumen* none.

Our Myrtleblooms are either tender exotics, or indigenous far South. The following table must suffice for their recognition.

* Calyx truncate. Petals connate into a caducous calyptra or lid...(*a*)
  a Fruit a capsule. Stam. free. Australian trees, alternate-leaved................EUCALYPTRA.
  a Fruit a berry. Stam. free. Leaves opposite. Small trees in S. Florida........CALYPTRANTHES.
* Cal. 4-lobed. Pet. 4, spreading. Fr. bac. Lvs. opp. Trees, shrubs. S. Fla. *Allspice*, &c..EUGENIA. 1
* Cal. 5-lobed. Pet. 5, spreading. Stam. long-exserted. Shrubs. Cultivated...(*b*)

b Stamens united into 5 sets. Fruit capsular. Lvs. alternate or opposite. Austrl. .MELALEUCA. 2
b Stamens distinct.—*c* Flowers in dense lateral cymes. (Lvs. alternate.) Austrl. .CALLISTEMON. 3
—*c* Flowers solitary, axillary. Sepals equal. Lvs. opposite. . .MYRTUS. 4
—*c* Flowers solitary, axillary. Sep. unequal. Opp. *Guava*. . .PSIDIUM. 5

1. **EUGÈNIA** JAMBOS. *Rose Apple.* Tree (20—30f in India), with lanceolate leaves. Flowers white, in terminal showy cymes. Fruit round-ovoid, crowned with the calyx, 1½′ diam., yellow, with a thick rind, which has a sweetish, *rose-like* flavor.

2. **MELALEÙCA** HYPERICIFÒLIA. Shrubby, 5f, with opposite, elliptic-oblong, shining, 3-veined leaves on the drooping branches. Flowers of a splendid red, in slender spikes, with innumerable stamens (1′ long) radiating in all directions.—**M.** LEUCADÉNDRON, the famous *Cajeput Tree* of the East, has long lance-linear leaves, white fls. spiked on the pendent branchlets. The trunk is black and the branches white.

3. **CALLISTÈMON** LANCEOLÀTUM. *Bottle-brush.* Beautiful shrub, with long, thick, lanceolate leaves, and the flowers in dense, cylindric spikes, crimson stamens innumerable, radiant at right angles, suggesting the English name. Often cultivated.

4. **MYRTUS** COMMUNIS. *Myrtle.* Evergreen shrub or tree of S. Europe, emblematic of victory in honorable contests. The leaves are long, ovate, shining, the flowers pure white or rose-tinged, with innumerable stamens, and the berries black.

ORDER LII. MELASTOMACEÆ. MELASTOMES.

Trees, *shrubs*, or *herbs*, with square branches and usually no stipules. *Leaves* opposite, undivided, dotless, and 3–5-veined. *Calyx tube* urceolate, adherent, at least to the angles of the ovary. *Petals* 4—6, convolute in bud. *Stamens* definite. *Anthers* opening by terminal pores. *Fruit* capsular or baccate.—Genera more than a hundred, all tropical except the following.

1. **RHÉXIA,** L. DEER-GRASS. Calyx 4-cleft, swelling at the base. Petals 4. Stamens 8, 1-celled. Styles declined. Capsules 4-celled, nearly free from the investing calyx tube. Seeds numerous. ♃ Leaves opposite, exstipulate, 3-veined. Flowers showy. June—September.

§ Anthers curved, saccate and appendaged at base. Flowers purplish. . .(*a*)
a Stem square, winged. Leaves ovate to lanceolate, bristly-serrate. . . . .Nos. 1, 2
a Stem terete or teretish. Leaves lanceolate to linear. . . . . .Nos. 3, 4
§ Anthers straight, oblong.—*b* Stems simple, with purple flowers. . . . . .Nos. 5, 6
—*b* Stems brachiate, with yellow flowers. . . . . No. 7

1 **R. Virgínica** L. *Meadow Beauty.* Stem narrowly 4-winged; leaves sessile, and with the stem clothed with scattered hairs; calyx hispid. Wet grounds, E. Mass., S. and W. 12—16′. Cymes corymbed. Flowers purple. July, August.

2 **R. stricta** Ph. Stem tall, strongly 4-winged, glabrous; leaves acuminate, glabrous; calyx glabrous, tube very short. Bogs, S. 3—4f. Purple. June, July.

3 **R. Marìana** L. Hairy; leaves lanceolate and lance-linear, acute, bristly-serrate, tapering to a short petiole. Sandy bogs, N. J. to Fla. 1—2f. Purple.

β. lineàris. Diffusely branched; lvs. almost linear. South. (R. lanceolata Walt.)

4 **R. glabèlla** Ph. Glabrous, glaucous; lvs. lanceolate, subserrulate, acute, sessile; cal. glandular-hispid. Damp woods, S. 2—3f. Fls. few, large, purple. June—Aug.

5 **R. ciliòsa** Mx. Stem 1—2f, squarish; leaves broad-ovate, sparsely hispid above, margin ciliate with long bristles; flowers few, subsessile, terminal; calyx glabrous, lobes acute. Damp woods, Md. to Fla. Petals roundish. June—August.

6 **R. serrulàta** N. Stem 6—8′, square; leaves small, roundish-oval, glabrous both sides, serrulate-ciliate; calyx glandular-hispid, lobes obtuse. Swamps, S.

7 **R. lùtea** Walt. Leaves oblong-linear; flowers panicled; calyx much constricted above the ovary, limb bell-form, with cuspidate teeth. Damp woods, S. 18′.

2. **CENTRADÈNIA** ROSEA, from Mexico, is often seen in conservatories. A small shrub, with opposite, lanceolate leaves (one of each pair much smaller or obsolete). Fls. 4-parted, roseate, in numerous hanging clusters. Sta. 8, anthers appendaged.—**C.** GRANDIFÒLIA has the large lanceolate leaves crimson beneath, and cymes erect.

ORDER LIII. LYTHRACEÆ. LOOSESTRIFES.

Plants with entire, exstipulate, mostly opposite leaves, with a tubular *calyx* bearing the (4—7) petals and stamens in its throat, and a compound ovary and style. *Stamens* 4—14, rarely ∞. *Fruit* capsular and free, or baccate, 2—6-, or by abortion, 1-celled, ∞-seeded. *Albumen* 0.

§ Shrubs, with alternate leaves, ∞ stamens, and a bell-shaped calyx................LAGERSTRŒMIA. 1
§ Shrubs, with opposite leaves, ∞ stamens, and a tubular, adherent calyx..........PUNICA. 2
§ Herbs—*a* Flowers irregular. Calyx inflated, gibbous at base........................CUPHEA. 3
—*a* Flowers regular.—*b* Calyx cylindrical, striate, with 5 minute horns......LYTHRUM. 4
—*b* Calyx campanulate,—*c* 5 teeth with 5 long horns....NASÆA. 5
—*c* 4 teeth with 4 short horns...AMMANNIA. 6
—*c* 4 teeth. Horns 0. Petals 0..DIDIPLIS. 7

1. **LAGERSTRŒ́MIA** INDICA. CRAPE MYRTLE. Petals 6, crisped, on claws inserted into the calyx tube. Sta. ∞. Lvs. round-ovate, thick, smooth. Branches winged. Flowers blue-purple, in panicles. Common S. † and §. From E. India.

2. **PÙNICA** GRANATUM. POMEGRANATE. Lvs. lanceolate. Pet. 5, oval, obtuse, erect, scarlet, large. Fr. large, crim., crowned with the calyx, eatable, of singular structure, being 3-celled below and 5-celled above, 10—20f. Hardy in Fla. and La. (Eur.)

3. **CÙPHEA,** Jacq. Calyx tubular, 12-veined, gibbous at base, with 6 erect teeth, and often as many intermediate processes. Pet. 6 or 7, unequal. Stam. about 12, unequal. Sty. filiform. Caps. thin, 1–2-celled, few-seeded.

1 **C. viscosíssima** Jacq. ① Viscid-pubescent; branches alternate; lvs. opp., lance-ovate; flowers violet-purple, short-stalked, 1 in each axil; capsules bursting laterally before ripe. Wet grounds, Mass., W. and S. Not common. 9—18′. August.

2 **C.** PLATYCÉNTRA. Low, bushy perennial; leaves lanceolate; fls. with a scarlet calyx tube and short, purple petals, produced in profusion all Sum. From Mex. Not hardy.

3 **C.** STRIGULÒSA. Shrubby, hispid and viscid; lvs. oblong-ovate; cal. scarlet, gibbous at base; petals 6, subequal, large, violet-purple, varying to yellow; sta. 11, hairy.

4 **C.** SILENOÌDES. Lvs. lanceolate; cal. green and red; pet. 5, purple, 2 large and 3 small.

4. **LÝTHRUM,** L. LOOSESTRIFE. Calyx cylindrical, striate, limb 4–6-toothed, with as many intermediate, minute processes. Pet. 4—6, equal. Stam. as many or twice as many as the petals, inserted in the calyx. Style filiform. Capsule 2-celled, many-seeded. ♃ Mostly with entire leaves and purple or pale flowers. June—Aug.

§ Stamens as many as the petals. Flowers axillary, solitary................Nos. 1—3
§ Stamens twice as many as the petals. Flowers spicate or racemed........Nos. 4, β

1 **L. hyssopifòlia** L. *Grass-poly.* Glabrous, slender; branches square; lvs. alternate or opposite, linear or oblong-lanceolate, obtuse; fls. solitary, axillary, subsessile; pet. and stam. 5 or 6. Low grounds, coastward, Ms., N. Y. Rare. 6—10′.

2 **L. alàtum** Ph. Glabrous, erect, branched; stem winged below; lvs. lance-ovate, acute, sessile, broadest at base, alternate and opposite; flowers axillary, solitary, with 6 wavy petals and 6 short stamens. Damp. S. and W. 1—2f.

3 **L. lineàre** L. St. slender, somewhat 4-angled, branched above; lvs. linear, mostly opposite, obtuse; fls. nearly sessile; pet. and sta. 6. Swamps, N. J. to Fla. 2—4f.

4 **L. Salicària** L. More or less pubescent; lvs. lanceolate, cordate at base; fls. nearly sessile, in a long, somewhat verticillate, interrupted spike; pet. 6 or 7; stam. twice as many. Wet meadows, N. Eng., N. Y. Rare. 2—5f. Fls. showy, purple. †

β. ROSEUM. Flowers rose-red, in many spikes, all summer. A fine garden variety.

5. **NESǼA,** Juss. Calyx short, broadly campanulate, with 5 erect teeth, and 5 elongated, spreading, hornlike processes. Sta. 10, alternate ones very long. Sty. filiform. Caps. globous, included, ∞-seeded. ♃ Lvs. opposite or verticillate. Flowers axillary, purple.

N. verticillàta Kunth. Swamps, common. Stems woody at base, stoloniferous, 2—4f. angular; lvs. lanceolate, acuminate, opposite or in whorls of 3's; fls. in a long, leafy, showy, slender panicle of umbels. (Decodon verticillatum Ell.)

6. **AMMÁNNIA,** L. Calyx campanulate, 4–5-toothed or lobed, generally with as many hornlike processes, alternating with the lobes. Pet. 4 or 5. Sta. as many, rarely twice as many as the calyx lobes. Capsule globular, 2–4-celled, ∞-seeded. ① Stems square and leaves opposite, entire. Flowers axillary.

1 **A. hŭmilis** Mx. St. branched from the base, ascending; lvs. lanceolate, obtuse, tapering at base into a short petiole: fls. solitary, closely sessile, all the parts in 4's; sty. very short. Ditches. A low herb, with inconspicuous flowers. Aug., Sept.

2 **A. latifòlia** L. St. erect, branching; lvs. linear-lanceolate, acute, dilated and auricled at the sessile base; cal. 4-angled, 4-horned; fls. crowded. Wet, W. 1—2f. Purp.

7. **DÍDIPLIS,** Raf. Calyx 4-lobed, without accessory teeth. Pet. 0. Sta. 2—4. Ov. 2-celled. Stig. 2-lobed, subsessile. Caps. globous, bursting irregularly, ∞-seeded. ♒ Leaves opposite, crowded, linear. Flowers axillary, sessile, minute. (Hypobrichia, Curt.)

D. diándra.—Ponds and sluggish streams, Ill. and S. 10—20′ long. Jn.-Aug.

ORDER LIV. ONAGRACEÆ. ONAGRADS.

Herbs, rarely *shrubs*, with the flowers 4-(sometimes 2 or 3)-parted, with the *calyx tube* adhering to the 2–4-celled ovary, and teeth valvate in the bud; the *petals* convolute in the bud, sometimes obsolete as well as the calyx teeth. *Stamens* as many or twice as many as the petals or calyx teeth. *Ovary* 2–4-celled, *styles* united, and *stigmas* capitate or 4-lobed. *Fruit* capsular or baccate, 2–4-celled. *Seeds* with little or no albumen. Figs. 13, 54, 138, 317, 385.

* Stamens 8, or twice as many as the petals or sepals...(*a*)
a Calyx tube not prolonged above the ovary.—*b* Seeds comous....................EPILOBIUM. 1
—*b* Seeds glabrous..................JUSSIÆA. 2
a Calyx tube prolonged,—*c* the free summit slender.—*d* Seeds comous, ∞......ZAUSCHNERIA. 3
—*d* Seeds glabrous, ∞.....ŒNOTHERA. 4
—*d* Seeds glabrous, 1—4....GAURA. 5
—*c* the free summit enlarged,—*e* short. Pet. clawed....CLARKIA. 6
—*e* long. Pet. sessile.....FUCHSIA. 7
* Stamens 4 or 2, as many as the sepals.—*d* Flowers 4-parted..........................LUDWIGIA. 8
—*d* Flowers 2-parted.......................... ...CIRCÆA. 9

1. **EPILÒBIUM,** L. WILLOW-HERB. ROSE BAY. Cal. tube not prolonged beyond the ovary, limb deeply 4-cleft, deciduous. Sta. 8. Stig

often with 4 spreading lobes. Ov. and caps. linear, 4-cornered, 4-celled, 4-valved. Seeds ∞, comous with long silky hairs. ♃ Flowers purple to white. July—Sept.

* Lvs. alternate. Fls. showy, expanding. Stig. with 4 long lobes. Sty. declined..No. 1
* Lvs. opposite. Fls. small. Stigma undivided.—*a* Petals entire...........Nos. 2, 3
—*a* Petals 2-lobed..........Nos. 4, 5

1 **E. angustifòlium** L. St. simple, erect; lvs. lanceolate, subentire with a marginal vein; rac. long, terminal, spicate; pet. unguiculate, purple; stig. with 4 linear, revolute lobes. In newly-cleared lands, fence-rows, &c., E. and W. 4—6f.
β. ***canescens.*** Flowers pure white throughout; ovaries silvery canescent.

2 **E. alpìnum** L. St. creeping at base, usually with 2 pubescent lines, few-flwd.; lvs. glabrous, oblong-ovate, obtuse; caps. glabrous. High Mts. N. 6—12′. Fls. pale-roseate.
β. ***nutanc.*** Taller (1f), nodding at the summit; lvs. oblong, denticulate. White Mts.

3 **E. palústre** L. *β.* ***albiflòrum.*** Minutely downy, branching; lvs. sessile, linear or narrowly lance-lin.; caps. pubescent. Swamps, Pa., N. & W. 6′—2f. Fls. nearly wh.

4 **E. molle** Torr. Velvety-pubescent, strict, branched above; lvs. sessile, crowded, lanceolate- to linear-oblong, subentire; pet. deeply-emarginate, rose-color. Swamps, E. and W. 1—2f. Varies to nearly smooth, and less leafy. (N. Y., Hankenson.)

5 **E. coloràtum** Muhl. Nearly smooth, much branched; lvs. lance-oblong, dent-serrulate, some petiolate, often with reddish veins; pet. 2-cleft, rose-color. Wet. 1-3f.

2. JUSSIÆ̀A, L. Calyx tube long, but not produced beyond the ovary; the lobes 4—6, leafy, persistent. Pet. 4—6, spreading. Sta. 8—12. Pod 4–6-celled, long, opening between the ribs. Seeds very numerous.—Herbs with alternate leaves and yellow flowers.

1 **J. decúrrens** DC. Glabrous; fls. 4-parted, 9″; st. erect, branched, winged by the decurrent, lanceolate lvs.; pod clavate, 4-angled. ♃ Wet. Pa., and S. 6-20′. Jl.-Sep.

2 **J. repens** L. Smooth, or hairy above, creeping, with erect branches; fls. 5-parted, 2′; lvs. oblanceolate to oblong, narrowed to the slender pet.; ov. much shorter than the ped. ♃ Ponds, ditches, Pa. to Ill., and S. 2—3f. May—Aug. (J. grandiflora Mx.)

3 **J. leptocárpa** N. Hairy; fls. mostly 6-parted, small (9″); lvs. lanceolate, subsessile; pod slender, much longer than the ped. ① Marshes, Fla. to La. 1—2f. June.

3. **ZAUSCHNÈRIA** Califórnica. ♃ Bushy, hairy-viscid, with lanceolate leaves and scarlet (varying to white) flowers resembling Fuchsias. Sta. exserted.

4. ŒNOTHÈRA, L. Evening Primrose. Calyx tube prolonged beyond the ovary, deciduous. Segm. 4, reflexed. Pet. 4, equal, obcordate or obovate. Sta. 8. Caps. 4-celled, 4-valved. Stig. 4-lobed. Seeds many, without a coma.—Herbs with alternate leaves. Summer.

* Native. Fls. nocturnal, yellow. Pods sessile, oblong, terete.............Nos. 1—3
* Native. Fls. diurnal, yellow. Pods clubshaped, 4-angled and 4-ribbed..(*a*)
a Calyx tube not longer than the ovary. Fls. 5″ or 6″ diameter..........Nos. 4, 5
a Calyx tube about twice longer than the ovary. Fls. 15″—18″.........Nos. 6—8
a Calyx tube 3 or 4 times longer than the ovary. Fls. 2′—4′.............Nos. 9, 10
* Exotic.—*b* Fls. yellow, large. Tube much longer than the ovary........Nos. 11, 12
—*b* Fls. white, very large. Pods 4-winged and 4-ribbed..........Nos. 13, 14
—*b* Fls. purple or roseate. Tube short, funnel-form. Godetia..Nos. 15—18

1 **Œ. biénnis** L. St. erect, hirsute; lvs. ovate-lanceolate, repand-denticulate; fls. in a terminal, leafy spike; cal. tube 2 to 3 times longer than the ovary; stam. shorter than the obcordate or obtuse petals; pod oblong, obtusely 4-angled. Com. 2—5f.

β. ***muricàta.*** Stem rough-hirsute; petals but little longer than the stamens.

γ. ***grandiflòra.*** St. branching; pet. much longer than stam., deeply obcordate. †

δ. ***parviflòra.*** Calyx tube elongated; petals small, as long as the stamens.

ε. ***cruciàta.*** Petals linear-oblong, shorter than the stamens.

ζ. ***canéscens.*** Petals enlarged; whole plant canescently hairy.

2 **Œ. rhombipétala** N. St. erect, tall, smooth; lvs. lance-linear; pet. rhombic-elliptical, pointed; cal. tube 3—4 times longer than ovary. ② Prairies, W. 2—3f. †

3 **Œ. sinuàta** L. Pubescent, decumbent at base; lvs. oval-oblong, sinuate-dentate, or incised; fls. axillary, solitary; tube twice longer than ovary. ① N. J. and S. 3—8′.

β. *mínima.* Low, simple, 1-flowered; lvs. subentire. Pine-barrens, N. J. and S.

4 **Œ. púmila** L. Low, pubescent, half-erect; lvs. lanceolate; fls. 6″, in a leafy spike; calyx tube shorter than the oblong-clavate ovary. ② Meadows, Can. to Car. 6—10′.

5 **Œ. chrysántha** Mx. Ascending, slender; fls. small (5″) crowded, spicate; lvs. lanceolate; cal. tube as long as the ovary; pet. emarginate. ② N. Y. to Wis. 12—18′.

6 **Œ. fruticòsa** L. St. rigid, hairy or downy; lvs. lance-oblong; rac. corymbed; fls. 18″ diam.; pod oblong-clavate, 4-winged, 4-ribbed, pedicellate. ♃ Hard soils. 1—3f.

7 **Œ. ripària** N. St. slender, branched, purple, and polished; lvs. lin.-lanceolate, petiolate, denticulate; rac. corymbed; fls. large (18″). Banks, N. J., and S. 1—2f. May+.

8 **Œ. lineàris** Mx. Hoary-puberulent, subsimple; lvs. linear, subentire, obtuse; fls. large, corymbed; pod obovoid. ♃ Montauk Pt. to Tenn., and S. 1—1½f. May, June.

9 **Œ. glauca** Mx. Smooth, glaucous; lvs. ovate, sessile, pointed; fls. large, clustered at the ends of the branches; pod oval. ♃ Va. to Ky., and S. 2—3f. May—July.

10 **Œ.** MISSOURIÉNSIS Sims. Simple, decumbent; lvs. thick, lanceolate, petiolate; fls. very large (4′), tube very long; pod very large, 4-winged. Dry hills, Mo. July—Oct.

11 **Œ.** NOCTÚRNA. St. erect, downy; lvs. lanceolate, repand-dentate. ② S. Af. 2f.

12 **Œ.** LONGIFLÒRA. Simple, hairy; lvs. lanceolate, denticulate; pet. 2-lobed. ② S. Am.

13 **Œ.** SPECIÒSA. Lvs. pinnatifid below; fls. diurnal, white, fading red. ♃ Ark. 18′.

14 **Œ.** TETRÁPTERA. Lvs. pinnatifid below; fls. nocturn., large, pure wh. ① Mex. 1-2f.

15 **Œ.** RUBICÚNDA. Erect; lvs. lance-linear; pet. rose-purp., orange at base. ① Cal. 2f.

16 **Œ.** LÍNDLEYI. Diffusely branched; lvs. lance-lin.; pet. lilac, red at base. ① Cal. 1f.

17 **Œ.** VINÒSA. Erect; lvs. linear-oblong; pet. white-roseate; fls. 2′ broad. ① Cal. 2f.

18 **Œ.** LÉPIDA. Erect, simple; lvs. lance-obl.; pet. pale-purp., crimson-spotted at edge.

5. **GAURA,** L. Calyx tube much prolonged above the ovary, cylindric, limb 4-cleft. Pet. 4, unguiculate, somewhat unequal. Sta. 8, declinate, alternate ones a little shorter. Ovary oblong, 4-celled, nut usually by abortion, 1-celled, 1-4-seeded.—Herbaceous or shrubby. Lvs. alternate. Flowers white and red, in slender spikes. July, August.

1 **G. biénnis** L. St. branched, pubescent; lvs. lance-oblong, spikes dense; cal. tube as long as the segments, the pet. rather shorter. ② Dry bluffs, rare, handsome. 3—5f.

2 **G. filipes** Spach. Paniculate and naked above; lvs. linear-oblong, tufted at the base of the slender racemes; calyx segments longer than the tube or petals; pods obovoid-clavate, on slender pedicels. Dry soils, S. and W. 3—5f.

3 **G. angustifòlia** Mx. Pubescent; lvs. linear, very acute; calyx seg. much longer than tube or pet.; pod sessile, ovoid, sharply 4-angled. S. Car. to Fla. Fls. small, wh.

4 **G.** LINDHEIMERI. Erect, much branched; lvs. lin.; cal. red; pet. blush, long in bloom.

6. **CLÁRKIA,** Ph. Calyx tube slightly prolonged beyond the ovary, limb 4-parted, deciduous. Pet. 4, unguiculate, 3-lobed or entire, claws with 2 minute teeth. Sta. 8. Sty. 1, filiform. Stig. 4-lobed. Capsule largest at base, 4-celled, 4-valved, many-seeded.—① Herbs (from Oreg. and Cal.) with showy, axillary flowers.

1 **C.** PULCHÉLLA. Lvs. lin.-lanceolate; pet. 3-parted; 4 sterile sta. Fls. wh., rose, or lilac

2 C. ÉLEGANS. Lvs. lance-ovate; pct. rhombic-ovate; sta. all fertile. Purple to white.
3 C. RHOMBOÌDEA. Lvs. ovate-obl.; pet. rhomb.-ovate, 2-toothed, lilac, with purple spots.

7. FÚCHSIA, L. LADIES' EARDROP. Calyx tubular-funnel-form, colored, deciduous, limb 4-lobed. Pet. 4, in the throat of the calyx. Sta. 8, exserted. Disk glandular, 8-furrowed. Baccate capsule oblong, obtuse, 4-sided. ♄ S. American, beautiful. Fls. drooping, axillary. Figs. 54, 138.

1 F. COCCÍNEA. Smooth; lvs. opp. or 3-whorled, ovate, denticulate; pet. convolute, violet-purple, half as long as the scarlet sepals, quarter as long as the purple stamens.
2 F. GRÁCILIS. Half-shrubby; lvs. ovate, glandular-dentate; pet. nearly as long as sep.
3 F. FULGENS. Lvs. cordate-ovate; cal. tube long, trumpet-shaped, bright red.—Many hybrid varieties of the above three species are in cultivation.

8. LUDWÍGIA, L. BASTARD LOOSESTRIFE. Calyx tube not prolonged beyond the ovary, limb 4-lobed, mostly persistent. Pet. 4, equal, obcordate, often minute or none. Sta. 4, opposite the sepals. Sty. short. Caps. short, 4-celled, 4-valved, many-seeded, and crowned with the persistent calyx lobes. ♃ and mostly ≈. Leaves entire. Flowers in summer.

§ Leaves opposite. Stems creeping.—*a* Petals none. Flowers very small...Nos. 1, 2
—*a* Petals yellow, showy..............Nos. 3, 4
§ Leaves alternate, sessile. Stems mostly erect...(*b*)
b Petals large, yellow. Pods pedicellate, short..........................Nos. 5—7
b Petals small, yellowish. Pods sessile, elongated, smooth.............Nos. 8, 9
b Petals 0 or minute.—*c* Pods elongated, hairy or smooth..............Nos. 10, 11
—*c* Pods short, rounded, shorter than the sepals..Nos. 12, 13
—*c* Pods short, square,—*d* axillary..............Nos. 14—16
—*d* capitate...................No. 17

1 L. palústris Ell. *Water Purslane.* Creeping or floating, smooth, some fleshy; lvs. ovate-spatulate, on winged petioles; fls. sessile, solitary, apetalous; pod oblong (2″), with 4 green angles. Stem 10—18′, round, reddish.
2 L. spatulàta T. & G. Ascending, branched, downy, not fleshy; lvs. obovate-spat., on winged petioles; fls. very small, sess.; pod ovoid, 4-sided, downy. Fla. 6–12′.
3 L. natans Ell. Creeping or floating, smooth; lvs. oblong, on margined petioles; fls. sessile; pet. as long as the calyx; ov. with 2 bractlets at base. Swamps, S. Pod 4″.
4 L. arcuàta Walt. Creeping, smoothish; lvs. linear-oblanceolate, tapering to the slender base; fls. solitary, on ped. twice longer than the lvs.; petals bright yellow, longer than the narrow sepals; pod clavate, finally arcuate. Va. to Fla. 3—10′.
5 L. alternifòlia L. *Seed Box.* Erect, glabrous; lvs. lanceolate, acute; ped. axillary, 2-bracted; sep. large, purplish, crowning the 4-winged pod. Swamps. 1—3f.
6 L. hirtèlla Raf. Erect, hairy; lvs. ovate-oblong, obtuse; ped. axillary, 2-bracted; sep. shorter than the yellow petals; pod 4-winged, subglobous. Wet. N. J. to Fla. 1-3f.
7 L. virgàta Ph. Erect, with virgate branches, smoothish; lvs. oblong to linear, obtuse; fls. large; pet. longer than the leafy calyx, which is finally persistent and reflexed on the roundish-cubical 4-winged pod. Dry soils, S. 2—3f. Flowers 1′.
8 L. lineàris Walt. Slender, with erect branches; lvs. lance-linear, acute; fls. axillary, sessile; pet. obovate-obl.; pod clavate, 4-sided, longer than sep. N. J. and S. 2f.
9 L. linifòlia Poir. Simple, erect from a creeping base; lvs. spreading, lin., attenuate at base; sep. ovate, pointed, equalling the pet. and oblong pods. Mud, S. 1f. Lvs. 1′.
10 L. cylíndrica Ell. Smooth; lvs. lanceolate; fls. minute, 1—3 together, apetalous; pod slender, cylindrical, blunt, longer than the calyx segm. S. Car. to Fla. and La. 3f.
11 L. pilòsa Walt Villous-pubescent; lvs. lanceolate; fls. axillary and spiked above; pod villous, oblong, 4-sided, as long as the ovate, pointed sepals. Swamps, S. 2f.

12 **L. sphærocàrpa** Ell. Lvs. lanceolate, attenuate to base; ped. subsol., bractless, short; sep. as long as the small subglobous pod. Wet swamps, Mass. to Ga.: rare. 3f.

13 **L. microcárpa** Mx. Ascending from a creeping base; lvs. spatulate-obovate; sep. roundish, acuminate, larger than the very small obovoid pod. Wet, S. 1f.

14 **L. alàta** Ell. St. slender, strongly 4-angled; lvs. wedge-lanceolate; fls. in the upper axils few, white, apet.; pod cubic-obconic, winged; sds. ovoid. Marshes, S. 2–3f.

15 **L. lanceolàta** Ell.? (Chapm.) St. stout, terete; lvs. lanceolate; fls. in all the axils green, apetalous; pod cubical, with sharp angles. Swamps, Ga. Fla. 1–2f, bushy.

16 **L. polycárpa** Short & Peter. Lvs. lance-linear, on the runners oblanceolate; fls. solitary, with 2 subulate bractlets at base; pod cubical-obconic. Swamps, W. 1—3f.

17 **L. capitàta** Mx. Erect; lvs. lance-linear to lance-obl., obtuse at the sessile base; flowers sessile, crowded in a terminal bracted head or spike. Wet barrens, S. 2—3f.

9. **CIRCÆ̀A**, L. Enchanter's Nightshade. Calyx slightly produced above the ovary, deciduous, limb 2-parted. Pet. 2, obcordate. Sta. 2. Caps. obovoid, uncinate-hispid or pubescent, 2-celled, 2-seeded. Sty. united. ♃ Leaves opposite. Flowers small, racemed. Figs. 13, 317, 385.

1 **C. Lutetiàna** L. St. erect, pubescent above; lvs. ovate, subcordate, acuminate, slightly repand-dentate, opaque, longer than the petioles; bracts none; fr. reflexed, hispid-uncinate. Damp shades. 1—2f. Rac. slender. Fls. rose-colored. June, Jl.

2 **C. alpìna** L. Smooth; st. ascending at base, weak; lvs. broad-cordate, diaphanous, dentate, as long as the petioles; bracts setaceous; caps. pubescent. Wet, rocky woods, N. Eng. to Oreg. 6—10′. Fls. white. Plant small and delicate. July, Aug.

Order LV. LOASACEÆ. Loasads.

Herbs often hispid with stinging hairs, with *leaves* opposite or alternate and no stipules. *Calyx* adherent to the ovary, 4 or 5-parted, lobes persistent, equal. *Petals* 5, or 10 in 2 circles. *Stamens* ∞. *Ovary* 1-celled, with several parietal placentæ.

1. **MENTZÈLIA**, L. Calyx tubular, limb 5-parted. Pet. 5—10, flat, spreading. Sta. ∞, 20 to 200. Ov. inferior. Sty. 3, filiform, connate, and often spirally twisted. Stig. simple, minute. Caps. 1-celled, many-seeded. —Branching herbs. Leaves alternate.

1 **M. oligospérma** Nutt. Very rough, with barbed hairs; stem dichotomous; lvs. ovate-lanceolate, lobed or incisely toothed; pet. entire, cuspidate, longer than the 20+ sta.; caps. 3-5-seeded. ♃ Dry rocks, Ill. Mo. and S. 1f. Fls. deep yellow, 9″. May–Jl.

2 **M. Floridàna** N. Slightly roughened; lvs. deltoid-ovate, unequally toothed, petiolate; pet. wedge-oval, obtuse; sta. 30; caps. 6-seeded. Fla. 1f. Fls. small, yellow.

3 **M. Lindleyi.** *Golden Bartonia.* Hispid; lvs. lance-ovate, pinnatifid, lobes often dentate; pet. broad obovate; seeds ∞; stamens 200. ① California. Fls. golden, 2—3′.

2. **LOÁSA**, Adans. Cal. 5-parted. Pet. 5, concave. Scales 5, petaloid, 2–3-lobed, connivent, with 2 sterile filaments inserted at base. Sta. ∞, in many fascicles. Style 3-fid. Caps. 1-celled, half 3-valved.

L. lateritia. *Brick-red L.* Climbing, stinging; leaves palmately lobed, cordate; fls. large, on long stalks, brick-red to orange. Chili. 20f. June—October.

Order LVI. TURNERACEÆ.

Herbs with alternate, exstipulate leaves, solitary, 5-parted flowers, a free calyx bearing the 5 petals and 5 stamens in its throat. *Ovary* 1-celled, with

3 parietal placentæ. *Styles* 3, distinct. *Fruit* a 3-valved capsule. *Seeds* albuminous, strophiolate.

TURNÈRA, L. Calyx campanulate. Styles 3. Stigmas 2–5-∞-parted or fringed. Caps. of 3 valves separating to the base. Herbs pubescent or tomentous. Flowers on jointed pedicels, yellow. (Piriqueta, Aub.)

1 **T. cistoìdes** L. Hairy, erect; lvs. lanceolate, obtuse, denticulate; the upper bract-like, shorter than the peduncles; pet. obovate, cor. 1′. Dry. S. 1f. June, July.
2 **T. tomentòsa.** Tomentous; lvs. oblong (1′), longer than the peduncles. Fla. 1f.
3 **T. glabra** (Chapm.) Smooth, branched; ped. 2—3 times longer than lin. lvs. Fla.

ORDER LVII. PASSIFLORACEÆ. PASSIONWORTS.

Plants often woody, climbing by tendrils, with alternate leaves and leafy stipules. *Flowers* perfect, 5-parted. *Calyx* tubular, the throat crowned with several rows of sterile filaments, and the corolla above them. *Stamens* 5, monadelphous, sheathing the stipe of the ovary. *Fr.* fleshy, ∞-seeded. Figs. 111, 112, 348.

PASSIFLORA, L. PASSION-FLOWER (*i. e.*, emblematic of our Saviour's passion). Cal. colored, deeply 5-parted, the throat with a complex filamentous crown. Ov. raised on a stipe. Stig. 3, with 5 large anthers. Fr. a pulpy berry. ♄ ♭ Fls. large, wonderful and beautiful. May—July.

1 **P. lùtea** L. Lvs. glabrous, cordate, 3-lobed, obtuse; petioles glandless; ped. mostly in pairs; pet. gr.-yel., narrower and much longer than sep. ♃ Woods, O., and S. 10f.
2 **P. incarnàta** L. Lvs. deeply 3-lobed, serrate; petioles with 2 glands above; involucre 3-leaved; crown triple, roseate. ♃ Dry fields, Va. to Fla. 20—30f. Pet. wh.
3 **P.** CŒRÙLEA. Shrubby; lvs. palmately 5-parted, entire; invol. 3-bracted; petioles glandular; pet. longer than the crown, blue, purple, and white. Brazil. Not hardy.

ORDER LVIII. CUCURBITACEÆ. CUCURBITS.

Herbs succulent, creeping or climbing by tendrils, with alternate leaves. *Flowers* monœcious or polygamous, never blue. *Calyx* 5-toothed, adherent. *Petals* 5, often united, inserted on the calyx. *Stamens* 5, generally cohering in 3 sets. *Anthers* united, contorted. *Ovary* 1-celled, with 3 parietal placentæ often filling the cells. *Fruit* a pepo or membranous. *Seeds* flat, with no albumen, often arilled. Figs. 186, 476, 482.

§ Corolla white,—*a* 6-cleft. Stigmas 2. Fruit echinate .... ECHINOCYSTIS. 1
—*a* 5-petalled. Pepo smooth, many-seeded .... LAGENARIA. 2
—*a* 5-parted. Berry smooth, few-seeded .... BRYONIA. 3
—*a* 5-lobed. Fruit prickly, 1-seeded .... SICYOS. 4
§ Corolla yellow,—*b* 5-lobed. Berry small, smooth, ∞-seeded .... MELOTHRIA. 5
—*b* 5-lobed. Pepo large. Seeds thick at edge .... CUCURBITA. 6
—*b* 5-cleft. Pepo large,—*c* Seeds colored, thick-edged .... CITRULLUS. 7
—*c* Seeds white, acute-edged .... CUCUMIS. 8

1. ECHINOCÝSTIS, T. & G. Flowers ☿. Calyx of 6 filiform-subulate segments, shorter than the corolla. Petals 6, united at base into a rotate-campanulate corolla. ♂ Sta. 3, diadelphous. ♀ Abortive fil. 3, distinct, minute. Style very short. Stig. 2, large. Fruit roundish, inflated, echinate, 4-seeded. ① Climbing, with branched tendrils.

E. lobàta T. & G. Alluvion, Can. to Penn. and W. Smoothish. Lvs. thin, palmately 5-lobed. Fls. small, white, the barren in large racemes, fertile few below. Jl.—Sep.

2. LAGENÀRIA, Ser. GOURD. Fls. ⚤. Calyx campan., 5-toothed. Pet. 5, obovate. ♂ Sta. 5, triadelphous. ♀ Stig. 3, thick, 2-lobed, subsessile. Pepo ligneous, 1-celled. Seeds arilled, obcordate, compressed, margin tumid.—Mostly climbing by tendrils.

L. VULGARE. Stem soft-pubescent; tendrils branched; lvs. roundish, cordate, 2 glands beneath at base; fls. solitary, peduncled, white; pepo bottle-shaped. ① Gardens.

3. BRYONIA, L. BRYONY. Fls. ⚤ or ♂ ♀. Cal. 5-toothed, teeth short. Cor. 5-cleft or -parted. ♂ Stamens 5, triadelphous, with flexuous anthers. ♀ Sty. trifid. Berry small, globular. ♃ Fls. greenish-wh. June.

B. Boykínii T. & G. Scabrous pubescent; lvs. deeply 3-5-lobed, cordate; flowers small, axillary, mixed, on short pedicels; berries 3-seeded, bright red. Ga. to La. 10f.

4. SÍCYOS, L. SINGLE-SEED CUCUMBER. Fls. ⚤. Cal. 5-toothed. Pet. 5, united at base. Anthers cohering, contorted. Styles 3, united at base. Fruit ovate, membranous, hispid or echinate, with one large, compressed seed. ♃ With compound tendrils. Flowers axillary, mixed.

S. angulàtus L. Hairy, branched; lvs. roundish, 5-angled or lobed, lobes pointed; fls. wh. with gr. veins, the ♂ in long rac., the ♀ smaller, capitate. Thickets. Jl.—Sep.

5. MELÒTHRIA, L. Fls. ♀ ☿ ♂ or ⚤. Calyx bell-form, limb in 5 subulate segments. Pet. 5, united into a bell-form corolla. Sta. 5, triadelphous. Style 1, stig. 3. Berry ovoid, small, ∞-seeded. ♃ Tendrils simple.

M. péndula L. Lvs. roundish, small, 5-lobed or angled, pointed; fls. axillary, ♂ in small rac., ♀ solitary, on long peduncles. N. Y. to Ga. Delicate. Fls. yellowish. Jl.

6. CUCÚRBITA, L. SQUASH. Fls. ⚤. Cal. 5-toothed, limb deciduous after flowering in ♀. Cor. bell-shaped, cohering with the calyx. Stam. 5, anth. connate, straight. Stig. 3. Pepo fleshy. Seeds thick at margin, smooth. ♃ Flowers yellow.

1 **C.** PEPO. *Pumpkin.* Rough-hispid; lvs. very large, cordate, 5-lobed or angled; fls. large, ♂ long-stalked; fr. very large, rounded, smooth, torulous, finally yellow. ①

2 **C.** MELOPÈPO. *Flat Squash.* Hairy; lvs. cordate, 5-lobed; fr. depressed-orbicular, margin torulous, smooth or warty, whitish. ① Hybridizes with No. 1.

3 **C.** VERRUCÒSA. *Crookneck S.* Hairy; lvs. cordate, deeply 5-lobed; fr. oblong or clavate, often elongated and curved at base. ① The varieties are numerous.

β. MEDULLÒSA. *Vegetable Marrow.* Lvs. triangular in outline, deeply 3-lobed; fr. oblong or club-form, dark-green and wh., 10—20′ long. Highly prized in England.

4 **C. maxima.** *Mammoth S. Winter S.* Rough-hairy; lvs. round-reniform, obtusely 5-lobed; fruit 10′—3f! diam., with a lobed, yellowish-white surface and dense pulp.

7. CITRÚLLUS, Neck. WATERMELON. CITRON. Cal. deeply 5-cleft, segm. linear-lanceolate. Pet. 5, united at base. Sta. triadelphous. Style trifid. Stig. reniform-cordate. Fr. rounded or oblong, the succulent placentæ filling the cell. Seeds colored, truncate at base. ♃

C. vulgàris Schrad. Hirsute; lvs. somewhat 5-lobed, the lobes sinuate-pinnatifid, glaucus beneath; fls. with a bract; fr. dark-spotted. ① India. Africa.

8. **CUCUMIS,** L. Fls. ♂ or ☿. Cal. tubular-campanulate, with subulate segments. Cor. deeply 5-parted. Sta. triadelphous. Style short. Stig. 3, thick, 2-lobed. Pepo elongated. Seeds lance-oblong, white, acute, not margined at the edge. ♄ Fls. axillary, solitary, yellow.

* Leaves angular, not lobed, subcordate. Tendrils simple..................Nos. 1, 2
* Leaves deeply-lobed or cleft. Tendrils simple or forked..................Nos. 3—5

1 **C.** SATÌVUS. *Cucumber.* Rough; lf. angles acute; fr. oblong, prickly when young. ①
2 **C.** MELO. *Musk Melon.* Hairy; lf. angles obtuse; fr. globular, torulous. ① Asia.
3 **C.** ANGÙRIA. *Prickly C.* Lvs. sinuate-lobed; tendrils simple; fr. ovoid, echinate.
4 **C.** COLOCÝNTHIS. *Colocynth.* Lvs. cut-lobed; tend. short; fr. round, yel., very bitter.
5 **C.** ANGUÌNUS. *Serpent C.* Lvs. 3-5-lobed; tendrils forked; fr. long, coiled, snake-like.

ORDER LIX. BEGONIACEÆ. BEGONIADS.

Herbs or *shrubby plants*, with alternate, inequilateral leaves, and diclinous, unsymmetrical flowers. *Perianth* of 2—∞ lvs., all petaloid or the inner only. *Stamens* ∞, anth. connate. *Ovary* inferior, 3-angled or winged, 3-celled, the placentæ in the angles. *Styles* united at base. *Albumen* 0, or thin.

BEGÒNIA, L. ♂ Sepals 2. Pet. 2, rarely more, or 0. ♀ Sepals 2, larger than the 4 petals. Cap. with 3 angles unequally winged, opening below the apex. Sds. ∞, minute. ♃ ♄ Lvs. alternate, stipulate, with the sides unequal, margins toothed or lobed. Fls. often showy. Species 320, mostly tropical, often found in the greenhouse. Much mixed.

§ Leaves feather-veined, and glabrous as well as the whole plant............Nos. 1—4
§ Leaves palmi-veined, with 5—9 veins from near the base...(*a*)
  a Plant glabrous throughout. Leaves toothed or crenulate.............Nos. 5—7
  a Leaves hairy, at least on the deeply 5-9-lobed margins..................Nos. 8, 9
  a Leaves hairy, at least on the undulate or toothed margins...(*b*)
    b Staminate flowers with 2 sepals only, the petals usually 0.......Nos. 10, 11
    b Staminate flowers with 2 sepals and 2 petals. E. India.........Nos. 12—15

1 **B.** MACULÀTA. Very smooth; lvs. ovate-oblong, wavy, cordate, white-spotted above, purple beneath; fls. white or flesh-colored, in forked cymes. Brazil. (B. argentea.)
2 **B.** FUCHSIOÌDES. Smooth; lvs. oblong to obovate, obtuse at base, serrulate; fls. bright red, drooping like Fuchsias, in many terminal cymes, very handsome. N. Granada.
3 **B.** SEMPÉRVIRENS. Leaves bristly on the crenate edges, ovate, subcordate; fls. white to rose-colored, 1′—18″, in an open panicle, with scarious, persistent bracts. Brazil.
4 **B.** INCARNÀTA. Leaves bristly-serrate, ovate to oblong; fls. roseate, large, in compound, pendulous cymes, with caducous bracts or 0. Mexico. (B. insignis.)
5 **B.** NÍTIDA. Leaves ovate, half-cordate, subcrenate, shining, green as well as the stipules; flowers purplish-white, with caducous bracts, on axillary peduncles. W. Ind.
6 **B.** SANGUÍNEA. Leaves oblique-ovate, deeply cordate, crenulate, red beneath, large; flowers white, small, many, in cymes longer than the leaves. Stalks red.
7 **B.** COCCÍNEA. Leaves oblique oblong, half cordate, dentate; stipules obovate, caducous; flowers scarlet, pendulous, 8″ broad, in cymes equalling the leaves (5′).
8 **B.** HIERACIFÒLIA. Leaves roundish, palmately 7-cleft, lobes toothed; fringed scales on the petiole above; scape long, with many roseate flowers, 1′ diameter. Mexico.
9 **B.** PARVIFLÒRA. Shrub rusty-downy; leaves ample, roundish, subcordate, 7-9-lobed, lobes serrulate; cymes 1f long, with numerous small pale flowers. Peru.

10 **B.** MANICÀTA. Leaves oblique-ovate, cordate, angular, toothed, with purple-fringed scales on the petioles; flowers flesh-colored, in open cymes, on long peduncles. Mex.

11 **B.** PHYLLOMANICÀTA. Stem covered with leaf-like bulblets; leaves broad-ovate, cordate, doubly dentate; peduncles longer than the leaves; flowers roseate. Brazil.

12 **B.** EVANSIÀNA. Leaves ovate, subcordate, bristly denticulate, purple beneath; flowers rose-colored, 1′, in cymes on long stalks. Our oldest species, from China.

13 **B.** REX. Leaves ample, ovate, cordate, variegated with zones of dark-green, silvery-gray, and purple, sinuate-crenate; scape 1—2f, with large roseate flowers. E. Ind.

14 **B.** GRIFFITHII. Like No. 13, but densely downy all over, even the large whitish fls.

15 **B.** XANTHÌNA. Lvs. like No. 13, but varied with metallic spots; scape with *yellow* fls.

ORDER LX. CACTACEÆ. INDIAN FIGS.

Plants with a green fleshy caudex or stock, angular or jointed, mostly leafless, armed with numerous prickles and terrible spines. *Flowers* solitary, mostly very showy. *Sepals* ∞ on the surface. *Petals* and *stamens* ∞ on the top of the ovary or calyx tube. *Fruit* fleshy, 1-celled, with parietal placentæ. *Style* filiform, with stellate *stigmas*. Figs. 472, 487.

* Calyx tube not produced above the ovary. Stock jointed, branching................OPUNTIA. 1
* Calyx tube produced above the ovary.—*a* Joints flat, leaf-like, spineless...(*x*)
—*a* Stocks 3 - ∞-angled or grooved, spiny...(*y*)
x Flowers rose-red, oblique, from the top of the short truncated joints................EPIPHYLLUM. 2
x Flowers pink to red, regular, from the notches of the long joints...................PHYLLOCACTUS. 3
y Stock long-cylindrical, many-ridged. Flowers lateral, long-tubed..............CEREUS. 4
y Stock depressed-globular to oblong. Flowers subterminal, short-tubed.........ECHINOCACTUS.
y Stock globular to conical. Flowers terminal, small, woolly-tubed..............MELOCACTUS. 5
y Stock globular to cylindrical, covered with tubercles. Flowers lateral.... ....MAMMILLÀRIA.

1. OPUNTIA, Mill. INDIAN FIG. Sep. and pet. ∞ adnate to the ovary, not produced into a tube above it, longer than the stamens, the inner obovate. Stig. 4—10. Berry smoothish or prickly. ♄ Branches composed of fleshy, mostly flattened joints. Lvs. small, deciduous, alternate, with tufts of prickles in their axils. Flowers large, yellow.

§ Joints obovate or broadly oval. Stigmas 8—10. Seeds many. Fr. eatable...Nos. 1—4
§ Joints oblong or nearly cylindrical. Stigmas 4—6. Seeds 1—6.............Nos. 5, 6

1 **O. Ficus-Indicus** Haw. Stock branches stout, erect-spreading, pale-glaucous; lvs. subulate, with pungent bristles, no spines; fr. bristly, obovoid, purple. Florida! to San Diego! 3—20f. Joints 1f. Fruit pleasantly acid. § Trop. Am.

2 **O. vulgàris** Mill. Stock prostrate, pale-glaucous; lvs. minute, scale-like, with ∞ bristles and few spines; fr. nearly smooth, ovoid, eatable, crimson when ripe. Dry rocks, &c., Ct. to Fla. 1—2f, the joints 4—6′. Flowers 1½—2′ broad. Pet. 7—10. Jn.

3 **O. Rafinésquii** Eng. Stock prostrate, bright green; lvs. spreading, subulate, longer (3—4″); spines 1-5 in each axil; petals 10-12, often purplish at base. Ky. to Ill., and W.

4 **O. Missouriénsis** DC. Stock prostrate; leaves minute, the axils bristly and with whorl of many spines; fruit prickly, dry. Wis., along the rivers, and W. June.

5 **O. polyántha** Haw. Erect; joints oblong, the upper bearing many flowers at top; spines strong, yellow, unequal; stigmas 6; fruit small, 6-seeded. Waysides, Fla. Jn.

6 **O. Pes-Corvi** Leconte. Stk. prostrate; joints compressed-cylindric, small (2′); spines in pairs, unequal; pet. few, spatulate; stig. 4; fr. small, prickly, 1-4-seeded. Ga., Fla.

7 **O.** BRASILÉNSIS. Stock cylindrical, 6—10f; branches short, bearing ovate joints, which are thin and somewhat leaf-like; spines 1—3 together, sharp and strong. Brazil.

2. EPIPHYLLUM TRUNCÀTUM. Stock consisting of short, flat, notched joints, truncate at top; flowers at top of the joints, 2—3′ long, conspicuously oblique. Style longer than the stamens or 6—8—10 reflexed petals. From Brazil. 1f.

3. **PHYLLOCÁCTUS** phyllanthoìdes. Stock consisting of narrow, ensiform, crenate joints, fleshy but leaf-like. Flowers 4′ long, open by day, with many rose-colored petals and sepals longer than the tube, gradually spreading. Mexico.

2 **P.** Ackermánni. Fls. scarlet; pet. channelled, pointed, very many, 3—4′. Mexico.
3 **P.** phyllánthus. *Spleenwort.* Joints ensiform, serrate; fls. 9—12′, the white funnel-form cor. much shorter than the slender tube, opening by night, fragrant. S. Am.

4. **CĔREUS**, DC. Sep. and pet. imbricated, adnate to and prolonged into a long tube above the ovary. Sta. and style filiform, adnate to the tube. Stig. 10. Berry scaly with the remains of the sepals. ♄ ♄ Stock fleshy, green, prismatic, often jointed, with fascicles of spines on the ridges.

1 **C.** grandiflòrus. *Night-blooming C.* Stock long, about 5-angled; flowers very large, nocturnal; pet. spreading 6—8′, pearl-white; sep. yellow. Mex. A magnificent flower.
2 **C.** triangulàris. Stock 3-angled, prickles bristly; fl. very large, white; sep. green.
3 **C.** flagellifórmis. Stock slender, long, prostrate, 10-angled, hispid; fls. pink-color, smaller, open by day many days in succession; tube longer than the petals.
4 **C.** serpentìnus. Stock 12-angled, 4f; spines white, bristly; fls. pale, open by night.
5 **C.** speciosíssimus. Stock 3- or 4-angled, erect, 4f; angles winged, undulate; fls. large (4′ long), with many red or crimson petals and white stamens, diurnal. Common.
6 **C.** senìlis. *Old-Man C.* Stk. erect, oblong, with tufts of long, white, hair-like bristles.

5. **MELOCACTUS** commùnis. Stock very succulent, roundish ovate, 1f, 12–18-ribbed, surmounted by a sort of spadix, consisting mostly of dense wool, in which at the top the small red flowers are imbedded. W. Indies.

Order LXI. FICOIDEÆ. Mesembryanths.

Plants fleshy, of forms variously singular, with entire, mostly opposite leaves, and solitary, regular flowers, remarkable for their profusion and duration. *Calyx lobes* 4 or 5. *Petals* ∞—5, or rarely 0. *Stamens* ∞, distinct, perigynous. *Ovary* more or less adherent. *Stigmas* 2—∞. *Capsules* 1-∞-celled, ∞-seeded. *Embryo* curved.

§ Petals and stamens ∞, in several rows. Capsule fleshy, valvate............Mesembryanthemum. 1
§ Petals none, stamens ∞—5. Capsule 3-5-celled, circumsessile..............Sesuvium. 2

1. **MESEMBRYÁNTHEMUM**, L. Ice Plant. Calyx lobes 5. Pet. linear, inserted with the filiform stamens on the calyx tube. ♃ ♄ Air bubbles beneath the epidermis appear like dew or frost.

1 **M.** crystallìnum. Procumbent, fleshy; lvs. large, ovate, acute, wavy at the margin, 3-veined beneath. ♃ Greece. Stem 1f. Flowers white, all summer. Not hardy.
2 **M.** grandiflòrum. Procumb.; lvs. cord. ovate; cal. 4-cleft, 2-horned; pet. pink. Afr.

2. **SESÙVIUM**, L. Sea Purslane. Sep. 5, united at base, colored inside. Sta. 5—50, inserted on the calyx tube. Ov. free, 3-5-celled. Sty. 3—5. Pyxis opening transversely by a lid. ♃ Prostrate sea-side herbs.

S. Portulacástrum Tourn. Lvs. linear-spatulate; fls. sessile or nearly so; sta. ∞. Sandy coasts, N. J. to Fla. 1f+. Plant very smooth and fleshy. Fls. axil., roseate. Jl.+.

Order LXIII. UMBELLIFERÆ. Umbelworts.

Herbs with hollow, striate stems, sheathing petioles, and flowers in umbels. *Calyx* adherent to the ovary. *Petals* 5, usually inflected at the point. *Stamens* 5. *Ovaries* 2-carpelled, surmounted by the fleshy disk which bears the petals and stamens. *Styles* 2, distinct, or united at their thickened bases. *Fruit* a cremocarp (§151), consisting of 2 coherent achenia called *mericarps*, which separate along the middle space, which is called the *commissure*.

Carpophore, the slender, simple, or forked axis attached to and supporting the mericarps at top, enclosed between them at the commissure.

Ribs, 5 ridges traversing each mericarp lengthwise, and often 4 intermediate or secondary ones, some, all, or none of them winged.

Vittæ, little tubular receptacles of colored volatile oil imbedded in the substance of the pericarp, just beneath the intervals of the ribs, and also sometimes in the face of the commissure.

Embryo in the base of abundant, horny albumen.

Figs. 42, 177, 235, 238, 303, 334–5, 369, 442–3.

A large and well-defined Order. As the flowers in all are nearly alike, the genera are best distinguished by characters taken from the fruit—the number and form of the ribs, the presence or absence of vittæ, the form of the albumen at the commissure, &c. These parts, therefore, minute as they are, will require the special attention of the student.

§ Flowers in simple umbels, sometimes spicate. Leaves simple...(*a*)
§ Flowers in capitate umbels, *i. e.*, sessile, forming dense heads...(*b*)
§ Flowers in regularly-compound umbels, not sessile in heads...(2)
  2 Fruit flattened on the back, singly-winged on the margin only...(*c*)
  2 Fruit flattened on the back, doubly-winged on the margin only...(*d*)
  2 Fruit flattened on the sides, or terete and not flattened either way...(3)
    3 Fruit slender, teretish, 2—3 times longer than wide. Flowers white...(*e*)
    3 Fruit nearly as broad as long.—*m* Flowers yellow...(*f*)
                                    —*m* Flowers white...(4)
      4 Ribs of the fruit either muricate, or crenulate-winged...(*g*)
      4 Ribs smooth, entire, winged or sharply prominent...(*h*)
      4 Ribs obtuse or obsolete.—*n* Calyx teeth obsolete or 0...(*k*)
                                —*n* Calyx teeth prominent...(*l*)

a Fruit flat, orbicular. Leaves round or roundish..............HYDROCOTYLE. 1
a Fruit globular. Leaves linear, fleshy phyllodia..............CRANTZIA. 2
  b Flowers partly sterile. Fruit densely muricate, few..............SANICULA. 3
  b Flowers all fertile. Fruit scaly, many in the head..............ERYNGIUM. 4
c Flowers of two sorts, the marignal with enlarged corollas, radiant..............HERACLEUM. 5
c Flowers all alike.—*o* Fruit with a thick, corky margin. Vittæ ∞..............POLYTÆNIA. 6
                     —*o* Fruit with a thin margin. Vittæ single..............PEUCEDANUM. 7
  d Seed adherent to the pericarp. Intervals with single vittæ..............ANGELICA. 8
  d Seed loose in the pericarp. Intervals with numerous vittæ..............ARCHANGELICA. 9
e Beak slender, longer than the fruit, all without vittæ. South..............SCANDIX. 10
e Beak short or none.—*p* Fruit clavate, upwardly hispid..............OSMORHIZA. 11
                      —*p* Fruit smooth, linear-oblong. Styles very short..............CHÆROPHYLLUM. 12
                      —*p* Fruit smooth, elliptical. Styles very slender..............CRYPTOTÆNIA. 13
f Involucels of 5 ovate, entire bracts. Leaves simple, entire..............BUPLEURUM. 14
f Involucels of 3 subulate bracts.—*r* Fruit laterally compressed..............CARUM. 15
                                    —*r* Fruit subterete transversely..............THASPIUM. 16
f Involucra none.—*s* Fruit laterally compressed. Vittæ ∞..............PIMPINELLA. 17
                   —*s* Fruit transversely subterete. Vittæ single..............FŒNICULUM. 18
  g Calyx teeth prominent. Ribs of the fruit muricate..............DAUCUS. 19
  g Calyx teeth obsolete. Ribs of the fruit crenulate-undulate..............CONIUM. 20
h Marginal wings twice broader than the dorsal..............SELINUM. 21
h Marginal and dorsal ribs alike sharp,—*u* with ∞ vittæ..............LIGUSTICUM. 22
                                        —*u* with single vittæ..............ÆTHUSA. 23
  k Fruit a double globe. Petals not inflected. Low, early-flowering..............ERIGENIA. 24
  k Fruit ovate-oblong. Petals emarginate-inflected. Involucra 0..............CARUM. 15

k Fruit round-ovate.—*v* Petals concave, not emarginate. Vittæ single........APIUM. 25
—*v* Petals inflected, emarginate. Vittæ ∞..............PIMPINELLA. 17
l Ribs of the carpels obsolete. Fruit ovate, covered with large vittæ............EULOPHUS. 26
l Ribs of each carpel 9. Fruit globular. Outer flowers radiant..................CORIANDRUM. 30
l Ribs of each carpel 5.—*x* Fruit round, didymous.............. ....CICUTA. 27
—*x* Fruit oval. Leaves pinnate.............................SIUM. 28
—*x* Fruit ovate. Leaves capillaceous.....................DISCOPLEURA. 29

1. HYDROCÓTYLE, L. PENNYWORT. Calyx limb obsolete. Pet. spreading, the point not inflected. Fr. laterally flattened, the commissure narrow. Carpels 5-ribbed, without vittæ. ≋ Low, smooth, creeping. Umb. simple. Invol. few-leaved. Fls. small, white. June—Aug. Figs. 334–5.

* Leaves reniform or cordate, the base lobes not united............... .....Nos. 1—3
* Leaves peltate, orbicular, the base lobes united... ....Nos. 4, 5

1 **H. Americàna** L. St. filiform; lvs. round-reniform, slightly lobed, crenate; umb. sessile, 3–5-flwd.; fr. orbicular. ♃ Damp shades. 2—6′. Plant very smooth and shining.
2 **H. ranunculoìdes** L. *f.* Lvs. round-reniform, deeply 3-5-cleft, lobes crenate; ped. 1—2′, branched; umbels 5–9-flwd., capitate. ♃ Waters, Va., and S. Lvs. veiny, 4–8′.
3 **H. repánda** Pers. Lvs. broad-ovate, cordate, rounded, margin repand-dentate; ped. 2—3′, simple; umb. capitate, 3 or 4-flwd.; invol. 2-bracted. ♃ Muddy shores, S.
4 **H. umbellàta** L. Lvs. crenate, with a notch at base, long-stalked (4—6′); scapes 4—6′, bearing a simple (rarely proliferous) umb. of 20–30 fls. ♃ Ponds, bogs. Ms. to La.
5 **H. interrúpta** Muhl. Lvs. crenate; umb. proliferous, 5-flwd. ♃ Wet. Ms. to Ga.

2. CRÁNTZIA, Nutt. Calyx margin obsolete. Pet. obtuse. Fr. subglobous. Carpels unequal, 5-ribbed, with a vitta in each interval. ≋ Small, creeping, with linear or filiform, entire lvs. Umbels simple, involucrate.

C. lineàta Nutt. Lvs. cuneate-linear, sessile, obtuse at apex, and with transverse veins, shorter than the peduncles. ♃ Muddy banks, coastward. Umb. 4–8-flowered.

3. SANÍCULA, Tourn. SANICLE. Fls. ♀ ☿ ♂. Cal. segm. acute, leafy. Pet. obovate, erect, with a long, inflected point. Fr. subglobous, armed with hooked prickles. Carpels without ribs. Vittæ numerous. ♃ Umbel nearly simple. Rays few, with many-flowered, capitate umbellets. Involucre of few, often cleft leaflets, involucel of several entire.

1 **S. Marilándica** L. Lvs. 5–7-parted, digitate, mostly radical; segm. thick, oblong, incisely serrate; sterile fls. many, pedicellate, fertile ones sessile; cal. segm. entire; styles slender, conspicuous, recurved. Woods: common. 2—3f. May—July.
2 **S. Canadénsis** L. Lower lvs. 5-parted, upper 3-parted; segm. cuneate-obovate, mucronate-serrate; sterile fls. few, much shorter than the fertile; sty. shorter than the prickles. Woods, thickets: com. 1–3f. Lvs. thin, 1–3′. Umb. few-flwd. Jn.–Aug.

4. ERÝNGIUM, Tourn. Fls. sessile, collected in dense heads. Cal. lobes somewhat leafy. Pet. inflexed. Sty. filiform. Fr. scaly or tuberculate, obovate, terete, without vittæ or ribs. ♃ ② Fls. blue or white, bracteate; lower bracts involucrate, the others smaller and chaffy. Summer.

* Scales and chaff of the heads entire, often spinescent....................Nos. 1—3
* Scales and chaff of the heads tricuspidate.—*a* Flowers white.... ....Nos. 4, 5
—*a* Flowers blue..... ....Nos. 6, 7

1 **E. yuccæfòlium** Mx. Erect; lvs. broadly linear, parallel-veined, ciliate with remote, soft spines; invol. bracts entire, spinescent, shorter than the ovoid-glob. heads. ♃ Prairies and pine-barrens, W. and S. 2—5f. Fls. white, inconspicuous. Jl., Aug.

2 **E. Baldwínii** Spr. Sts. prostrate, filiform; rt. lvs. wedge-oblong, st. lvs. 3-parted, segm. lance-lin., cut-toothed; invol. scales and chaff alike; hds. oblong. Fla. 10′. Blue.

3 **E. prostràtum** Baldw. Sts. prostrate, filiform, rooting; lvs. of two forms at the same node, small, some ovate, some 3-parted with lance-linear segm.; invol. scales linear, longer than the small oblong heads; fls. blue. ♃ Swamps, Ga. Fla. 6–12′. Jn. +

β. ***foliosum.*** Bracts of the invol. leafy, twice longer than the heads. Fla. La.

4 **E. aromáticum** Baldw. Sts. assurgent; lvs. short (1′), pinnate, with cuspidate segm., the 3 terminal largest; hds. globous (6—8″); invol. scales 5. Dry. Fla. 9—18′.

5 **E. Mettaùeri.** Erect, tall; lvs. linear-terete, consisting chiefly of the fistulous, jointed midvein, barely winged and toothed; bracts 8—10, leafy. Wet. Fla. 4—6f.

6 **E. Virginiànum** Lam. Erect; lvs. lance-oblong to linear, flat, the lower long-stalked, upper uncinate-serrate; bracts longer than the roundish head. ♃ Swamps. 2—4f. Hds. in umbel-like cymes, numerous, 5—6″. Varies with lvs. all linear. Jl. Aug.

7 **E. virgàtum** Lam. Erect; lvs. oval or oblong, thin, petiolate, dentate, the upper sessile; bracts 6—8, longer than the depressed, cymous heads. ♃ Wet, S. 2—4f.

5. **HERACLÈUM**, L. COW PARSNIP. Calyx 5-toothed. Pet. often radiant in the exterior flowers, and apparently deeply 2-cleft. Fruit compressed, flat, with a broad, flat margin, and 3 obtuse, dorsal ribs to each carpel; intervals with single vittæ. Seeds flat. ♃ Stout, with large umbels. Involucre deciduous. Involucels many-leaved.

H. lanàtum L. Villous; lvs. ternate, petiolate, tomentous beneath; lfts. petioled, round-cordate, lobed; fr. orbicular. Can. to N. Car. and W. 4f. Lvs. very large. June.

6. **POLYTÆ̀NIA**, DC. Calyx 5-toothed. Fruit oval, glabrous, compressed on the back, with a thickened, corky margin. Commissure with 4 to 6 vittæ. Seeds plano-convex. ♃ A smooth herb, with bipinnately-divided leaves. Involucre 0. Involucel of setaceous bracts.

P. Nuttàllii DC.—Prairies, W. 2—3f. Smoothish. Lower leaves long-stalked. Umbels 2′. Fruit 3″. May.

7. **PEUCEDÁNUM**, L. Fruit ovate, oval, or roundish, compressed on the back, the margin acute or broadly winged, carpels plane or convex, intervals with single vittæ. Seeds plano-convex. ♃ ② Smooth, rarely pubescent. Lvs. pinnately or ternately divided or decompound. Umbels compound, with or without involucra. Fls. yellow or white. Fig. 238.

§ EUPEUCEDÀNUM. Cal. 5-toothed. Lvs. pinnatisect. Fr. narrowly winged. Yellow...1, 2
§ ARCHEMÒRA. Cal. 5-toothed. Lfts. 1—11, narrow. Fr. narrowly winged. Fls. white. 3-5
§ PASTINÀCA. Calyx teeth 0. Lfts. oval. Fruit broadly winged. Flowers yellow....No. 6

1 **P. fœniculàceum** N. and other species with radical, pinnatisect leaves grow in Kansas, and W. (Rev. J. H. Carruth.)

2 **P.** GRAVÈOLENS. *Dill.* Lvs. cauline, tripinnate; seg. capillary; umb. on long stalks; fr. oval, flat, brown, aromatic, pungent, medicinal. ② Spain. 2f. (Anethum, C-B.)

3 **P. rígidum** *Cowbane.* St. rigid, striate; lvs. pinnate; lfts. 3—11, lance-ovate, sub entire; umb. 2 or 3, spreading, with slender rays; fr. with large purp. vittæ. ♃ Swamps, N. Y., W. and S. 2—5f. August.

β. ***ambigua***, has the leaflets linear and entire.

4 **P. ternàtum.** Stem slender, smooth; lvs. on long petioles, ternate; segm. very long, linear, entire, 3-veined; invol. 0-3-leaved; involucel 4-6-leaved. Swamps, in pine-barrens, S. 2—3f. Sept.—Nov. (Neurophyllum longifolium, C-B.)

5 **P. teretifòlium.** Tall, slender, smooth; lvs. reduced to fistular, jointed phyllodia, terete, tapering, 6—16′ long; fr. 3″; invol. 5-6-leaved. ♃ Wet, S. (Tiedmannia, C-B.)

6 **P. satìvum.** Root fusiform; stem furrowed: lvs. pinnate, downy beneath; lfts. oblong, incisely toothed, the terminal 3-lobed: umbels large; involucra nearly 0. ② Fields, gardens. 3—4f. July—Sept. ‡ Wild and Common Parsnip.

8. **ANGÉLICA,** L. Calyx teeth obsolete. Fruit dorsally compressed, doubly winged. Carpels 5-ribbed, the 3 dorsal ribs filiform, the 2 marginal winged, intervals with single vittæ. Carpophore 2-parted. Seed semi-terete. ♃ Leaves bi- or tri-ternate, sessile. Umbels terminal. Invol. 0 or few-leaved. Involucels many-leaved.

A. Curtísii Buckley. Lvs. biternate or with 3 quinate divisions; lfts. thin, ovate or lance-ovate, acuminate, incisely toothed; fr. broadly winged. Mts. Va. Car. Aug.

9. **ARCHANGÉLICA,** Hoffm. ANGELICA. Calyx teeth short. Fr. dorsally compressed, with 3 carinate, thick ribs upon each carpel, and 2 marginal ones dilated into membranous wings. Seed loose in the ripe carpel, covered with vittæ. ♃ Petioles usually large, inflated and 3-parted. Umbels perfect. Involucels many-leaved. Fls. greenish white. Fig. 177.

* Involucels less than half the length of the pedicels. Fruit 3″ long, winged....No. 1
* Involucels about as long as the pedicels.—*a* Fruit scarcely winged............No. 2
—*a* Fruit broadly winged....... .Nos. 3, 4

1 **A. atropurpùrea** Hoffm. St. dark purple, furrowed; petioles 3-parted, the divisions quinate; lfts. incisely toothed, terminal lft. rhomboidal, sessile, the others decurrent; involucels setaceous. Meadows, E. and W. 4—6f. Stout, aromatic. June.

2 **A. peregrìna** N. St. striate; lf. divisions ternate, segm. incisely serrate; involucel of many bracts, as long as the pedicels; fruit ribs corky, thick. Sea-coast, Mass. to Labrador. 2—3f. July. (A. Gmelini DC.)

3 **A. hirsùta** T. & G. Stem striate, the summit with the umbels tomentous-hirsute; lvs. bipinnately divided, the divisions quinate; segm. oblong, acutish, the upper pair connate, but not decurrent at base. Dry woods, N.Y. to Car. 2—5f. July.

4 **A. dentàta** Chapm. Slender, smooth; lvs. 1-2-ternate; segm. lance-ovate, incised; umbels few-rayed; involucel 5–6-leaved, as long as the pedicels. Ga. Fla. 2—3f. Jl.+

10. **SCÁNDIX,** L. VENUS'S COMB. Cal. limb obsolete. Fr. laterally compressed or nearly terete, attenuated into a beak which is longer than the seed. Carpels with 5 obtuse, equal ribs. Vittæ 0, or scarcely any. ① or ② Lvs. finely dissected. Invol. 0. Involucel 5–7-leaved. Flowers white.

S. apiculàta Willd. Petioles and peduncles slender; lvs. finely dissected into subulate segments; umbels 3-rayed; fruit with beak and forked style 9″. Ga. 1f. § Eur.

11. **OSMORHÌZA,** Raf. SWEET CICELY. Calyx margin obsolete. Sty. conical at base. Fr. linear, very long, clavate, attenuate at base. Carpels with 5 equal, acute, bristly ribs. Vittæ 0. Commissure with a deep, bristly channel. ♃ Leaves biternately divided, with the umbels opposite. Involucels 4–7-leaved. Flowers white. May, June. Figs. 42, 442–3.

1 **O. longístylis** DC. Sty. filiform, nearly as long as the ovary; fr. clavate; rt. spicy and sweet-flavored; st. and lvs. smoothish. Rich woods, Can. to Va. 1—3f. Fruit 1′.

2 **O. brevístylis** DC. Sty. conical, scarcely as long as the breadth of the ovary; fr. somewhat tapering at the summit; root nauseous; plant hairy. Woods. 1—3f.

12. **CHÆROPHÝLLUM,** L. CHERVIL. Calyx limb obsolete. Fruit laterally compressed, linear or oblong, contracted above but scarcely

beaked. Carpels with 5 obtuse, equal ribs, intervals with single vittæ. Commissure deeply sulcate. ① ② Leaves 2–3-pinnately divided. Segm. incisely cleft or toothed. Invol. 0, or few-leaved. Involucel many-leaved. Flowers mostly white. Umb. mostly sessile.

1 **C. procúmbens** Lam. Slender, spreading, smoothish; lf. segm. trifid and pinnatifid, lobes oblong, obtuse; umb. few-rayed, sessile or pedunculate; fr. acute, ribs narrower than the intervals. Damp woods, Ill. to Penn., and S. 1—2f. April, May.

2 **C. Tainturièri** Hook. Ascending or erect, some hairy; lf. segm. crowded, again pinnatifid or bipinnatifid, ultimate segm. acute; fr. short-beaked, ribs broader than the intervals. Ga. to Fla. and La. 10—20′. Much branched. Fruit 4″. March, Apr.

3 **C.** SATÌVUM. *Garden C.* Lf. segm. ovate, cut or cleft; fr. smooth, shining. Eur. 18′.

13. CRYPTOTǼNIA, DC. HONEWORT. Margin of the calyx obsolete. Fruit elliptical, with slender styles. Carpels with 5 obtuse ribs. Carpophore free, 2-parted. Vittæ very narrow, twice as many as the ribs. ♃ Leaves 3-parted, lobed and doubly-serrate. Umbels compound, with very unequal rays. Invol. 0. Involucels few-leaved. Flowers white.

C. Canadénsis DC.—Common in moist woods. Plant smooth, 2—3f, with large lfts. (3′ by 2′). Umb. panicled, slender, involucels minute. Fr. 2″ long, styles 1″. Jn.-Sept.

14. BUPLEÙRUM, Tourn. THOROUGH-WAX. Calyx teeth 0. Fruit laterally compressed. Carpels 5-ribbed, lateral ones marginal. Seed terete-ly convex, flattish on the face.—Herbàceous or shrubby. Lvs. (or phyllodia) entire. Involucra various. Flowers yellow.

B. rotundifòlium L. Lvs. (phyllodia) roundish-ovate, entire, perfoliate; invol. 0; involucels of 5, ovate, mucronate bracts. ① Fields, N. Y. to Va. Rare. § Europe.

15. CARUM, L. CARAWAY. ALEXANDERS. Cal. teeth minute or 0. Disk broad-conic. Fr. ovate or oblong, laterally compressed. Carpels 5-angled, with 5—10 prominent, filiform, equal ribs, the two lateral bordering the commissure. Intervals with a single, rarely 2, vittæ. Seeds subterete.—Leaves ternate to decompound. Involucra various.

§ ZIZIA. Lvs. simple, or 1–2-ternate, ovate. Cal. teeth minute. Pet. yellow...Nos. 1, 2
§ CARUM. Lvs. pinnately or ternately dissected. Cal. teeth 0. Pet. white...Nos. 3, 4

1 **C. aùreum.** *Golden Alexanders.* Lvs. 1–2-ternate; lfts. thin, lance-oblong, sharply serrate; umb. rays 1′; invol. 0; involucels 3-lvd.; fr. oval, the ribs acute or winged. ♃ Meadows and banks. 1—2f. Smooth throughout. Fls. deep yel. Jn. (Thaspium, N.)

2 **C. cordàtum.** Root lvs. simple, cordate, crenate, on long stalks; st. lvs. becoming 3-parted, ternate, or quinate, serrate: fr. roundish-oval, with acute or winged ribs; fls. yellow, varying to brownish. Rocky shades. 2—3f. May, June. (Thaspium, N.)

3 **C.** PETROSELÌNUM B. & H. *Parsley.* Leaf segm. numerous, wedge-ovate to lance-oblong, acute, incised; invol. lvs. few or 0; involucels subulate. ♃ Greece. 2—3f. Jn.

4 **C.** CARVI. *Caraway.* Lf. segm. numerous, linear to filiform; invol. 1-lvd. or 0; involucels 0. ♃ Europe. 2—3f. Lvs. large. Fls. white. Fr. oblong, aromatic. June.

16. THÁSPIUM, Nutt. GOLDEN ALEXANDERS. Calyx margin 5-toothed. Fruit ovoid, transversely subterete. Carpels semiterete, with 5 prominent or winged ribs, the lateral margined. Intervals with single vittæ. ♃ Umbels without an invol. Involucels 3-lvd., lateral. Fls. yellow.

1 T. barbinòde N. St. pubescent at the nodes; lvs. triternate and biternate; lfts. wedge-ovate, cut-serrate: fr. large (3′′), elliptical, 6-winged. River banks. St. 2—3f, angular and grooved. Rays 2′, each 20-flowered. Flowers deep yellow. June.

2 T. Wálteri Shutt. Stem rough-puberulent above; lvs. triternate to ternate; lfts. pinnatifid with linear-oblong segments; fruit oblong, narrowly 8–10-winged. Barrens, Ky. to E. Tenn. and W. Car. (Zizia pinnatifida Buckley.)

17. PIMPINÉLLA, L. ANISE. ZIZIA. Calyx teeth obsolete. Fruit ovate, oval, or roundish, laterally compressed and contracted at the commissure, ribs very slender, with many vittæ. Styles slender. Seeds teretely 5-angled. ♃ Leaves decompound. Involucra 0, or scarcely any.

1 P. integrifòlia (B. & H.) Smooth, glaucous; lvs. bi- or tri-ternate, with elliptic-oblong, entire, acute lfts. (1′); umb. (yellow) with 13 very slender (2—3′) rays; fr. oval, with 3 vittæ in each interval. Rocky woods. 1—2f. May—July. (Zizia, DC.)

2 P. ANÌSUM. *Anise.* Smooth, shining; root lvs. trifid, cauline multifid, with narrowly-linear segments; umbels large, many-rayed. Egypt. Richly aromatic.

18. FŒNÍCULUM, Adans. FENNEL. Fruit elliptic-oblong, subterete. Carpels each with 5 carinate ribs, intervals with single vittæ. Involucra 0. Leaves biternately dissected. Flowers yellow.

F. VULGÀRE. Leaf segm. linear-subulate, elongated, or filiform; umb. of 15—30 unequal rays. ② Europe. 3—5f. The turgid seeds are warmly aromatic. (Anethum, C–B.)

19. DAUCUS, Tourn. CARROT. Calyx limb 5-toothed. Pet. the 2 outer often largest and deeply 2-cleft. Fr. oblong. Carpels with 5 primary, bristly ribs, and 4 secondary, the latter more prominent, winged, and divided each into a single row of prickles, and having single vittæ beneath. ② Invol. pinnatifid. Involucels of entire or 3-cleft bracts. Fls. white, the central one abortive.

1 D. Caròta L. Stem hispid; lvs. tripinnatifid, the segm. linear, cuspidate-pointed; umbels dense, concave; invol. pinnate. Fields, waysides: common. 3f. § Eur.—In cultivation the root becomes conical, fleshy, red to yellow, and nutritious. Jl.—Sept.

2 D. pusíllus Mx. Slender, retrorsely hispid; lvs. bipinnatifid, divisions deeply lobed with linear-oblong, merely acute segments; invol. bipinnatifid. Dry soils, S. Car. to Fla., and W. 1—3f. June.

20. CONÌUM, L. POISON HEMLOCK. Calyx margin obsolete. Fruit ovate, laterally compressed. Carpels with 5 acute, equal, undulate-crenulate ribs, lateral ones marginal. Vittæ 0. Seeds with a deep, narrow groove on the face. ② Poisonous. Leaves decompound. Involucra and involucels 3–5-leaved, the latter unilateral. Flowers white.

C. maculàtum L. St. spotted; lvs. tripinnate; lfts. lanceolate, pinnatifid; involucel short; fruit smooth. Waste grounds, waysides. 4f. Much branched. An ill-scented narcotic. July. § Europe.

21. SELÌNUM, L. Calyx teeth obsolete. Fr. ovoid to oblong, terete. Carpels slightly compressed on the back, semiterete, with 5 winged ribs, the lateral wings broadest, intervals with 1 (rarely 2) vittæ. ♃ Glabrous, tall, branched. Lvs. pinnately decompound. Umb. rays ∞. Invol. bracts 0—few. Involucels ∞-bracted. Fig. 303.

S. Canadénse B. & H. Petioles large, sheath-like, inflated; lf. segm. linear-oblong, very acute, or acuminate; umb. 12-rayed, long-stalked; bracts lin.-filiform; fls. white, conspicuous. Wet woods, Me. to Va. and Wis., rare. 3-5f. Aug., Sept. (Conioselinum.)

22. LIGÚSTICUM, L. LOVAGE. Calyx teeth minute. Fruit as in Selinum, except that the intervals are filled with numerous vittæ. ♃ Glabrous. Lvs. ternately divided. Involucra few- ∞-bracted. Fls. white.

1 **L. Scóticum** L. *Sea L.* Lvs. 2-1-ternate; lfts. rhombic-ovate, cut-dentate, some oblique; invol. bracts ∞-linear; fr. oblong. Sea-coast, northward. 2f. Fruit 5″. July.

2 **L. actæfòlium** Mx. *Angelico.* Lvs. triternate, with ovate, dent-serrate leaflets; umbels panicled or triply compound; involucra about 3-bracted; fruit short. Woods, Ms. to Tenn. 3—6f. May—July.

23. ÆTHÙSA, L. FOOL'S PARSLEY. Calyx margin obsolete. Fruit globous-ovate. Carpels with 5 acutely-carinated ribs, lateral ones marginal, broader. Intervals acutely angled, with single vittæ, commissure with 2. ① Poisonous herbs. Leaves ternately or pinnately decompound. Involucra 0. Involucels one-sided, 3-leaved, deflexed. Flowers white.

Æ. Cynàpium L.—Waste grounds, N. Eng. to Penn.: rare. 2f. Stem green. Leaf segm. numerous, wedge-shaped, uniform. Plant ill-scented, dark green. Jl. § Eur.

24. ERIGENÌA, Nutt. DAUGHTER-OF-SPRING. Calyx limb obsolete. Pet. not inflexed, entire. Fr. contracted at the commissure. Carpels 3-ribbed, ovate-reniform. ♃ Rt. tuberous. Radical leaf triternately decompound. Involucrate lvs. solitary, biternately compound. Involucels of 3—6 entire, linear-spatulate bracts. Figs. 235, 369.

E. bulbòsa Nutt. A small, early-flowering herb, 4—6′. Shady banks, Western N. Y. and W. Tuber roundish, deep in the ground. Pet. white, anth. brown-purple (hence called *Pepper-and-Salt*). March, April.

25. ÀPIUM, L. CELERY, &c. Calyx teeth obsolete. Pet. not emarginate. Fr. ovate or globular, laterally compressed, often didymous. Carpels 5-angled, ribs equal, obtuse. Vittæ single in each interval. Carpophore undivided. Seed terete. ① ♃ Smooth. Leaves pinnately decompound. Involucra various. (Flowers white.)

§ HELOSCIÀDIUM. Lvs. simply pinnate. Involucels ∞-bracted. Fr. roundish.. Nos. 1—3
§ EUÀPIUM. Lvs. pinnately decompound. Involucels 0. Involucre 1-leaved... Nos. 4—6

1 **A. lineàre.** Stem angular, tall; lfts. 9—11 (3 above), linear-oblong or linear, tapering to a very acute point, serrate; umb. pedunculate; invol. ∞-bracted; fr. globular with very prominent ribs. ♃ Wet. 2—4f. July. Aug. (Sium, C-B.)

2 **A. Carsònii** (Durand). Erect, branched; lfts. 3—7, lin. to ovate, serrate to gashed fr. broadly ovate, the ribs filiform, with broad intervals. Wet. Conn. to Penn. Jn., Jl.

3 **A. nodiflòrum.** Stems procumbent; lvs. pinnate; lfts. lance-oblong, equally serrate; umb. opposite the lvs., subsessile; invol. 0-2-lvd. ① Wet. S. Car. 1—2f. Apr. §

4 **A. leptophýllum.** Erect or diffuse; lf. segm. linear to filiform; umb. opp. the lvs., sessile; fr. very small (½″), globular, with thick ribs. ① Ga. to La. Jn. (Helosc.)

5 **A. divaricàtum.** Small and slender; lf. segm. filiform or capillary, obtuse; umb. very small, pedunculate, 3-5-rayed; fr. rough with minute scales. ① Dry sands, S. 2—8′. March, April. (Leptocaulis, N.)

6 **A.** GRAVEÒLENS. *Celery.* Lvs. on long petioles, segm. broad-cuneate, incised, upper lvs. 3-parted and cut-lobed; invol. 0; fr. roundish. ② Eur. Well known as a salad.

26. EÙLOPHUS, N. Calyx limb 5-toothed, deciduous. Fr. contracted laterally, somewhat double. Carpels surrounded with large vittæ, ribs obsolete. Seed channelled on the inner face. ♃ Smooth, branched. Lvs. ternately decompound. Invol. nearly 0. Involucel setaceous. Fls. white.

E. Americàna N. Lvs. mostly radical; segm. lance-lin., 1′ long, acute, upper lvs. in 3 long, entire seg.; umb. long-stalked, 3–10-rayed. Prairies, O. to Ill. and Tenn. 3—4f.

27. CICÙTA, L. WATER HEMLOCK. Calyx margin of 5 broad segments. Fr. subglobous, didymous. Carpels with 5 flattish, equal ribs, 2 of them marginal, intervals filled with single vittæ. Seeds terete. ♒ ♃ Poisonous. Leaves compound. Stems hollow. Umbels perfect. Invol. few-leaved or 0. Involucels many-leaved. Flowers white.

1 **C. maculàta** L. St. streaked with purple; lower lvs. triternate and quinate, upper biternate; segments lanceolate, mucronately serrate, the veins running to the notches. Wet meadows. 3–6f. Smooth, glaucous. Leaflets 1—3′. Fruit 1½″, 10-ribbed. Umbels 3′. July, August.

2 **C. bulbifèra** L. Lvs. biternate; lfts. linear, with remote, divergent teeth; lvs. of the branches 3-cleft or simple, subopposite, bearing bulblets in their axils. Swamps, Can. to Penn. and W. 3—4f. Leaflets 2—4′ by 1—4″. Umbels few. August.

28. SIUM, L. WATER PARSNIP. Calyx teeth acute. Pet. obcordate, with an inflexed point. Fr. nearly oval, laterally compressed. Carpels with 5 obtusish ribs, and several vittæ in each interval. Carpophore undivided. ♃ Leaves pinnate, dentate. Umbels perfect, with many-leaved involucra. Flowers white.—Stout herbs.

S. latifòlium L. St. angular, sulcate; lfts. oblong-lanceolate, acutely and coarsely serrate, barely acute; cal. teeth conspicuous. Swamps, Ind. (Green Co.!) and Can. 3—4f. Lfts. 4—6′ by 1—2′, 2–10-toothed. Umb. with 20—30 long (3–4′) rays. Jl., Aug.

29. DISCOPLEÙRA, DC. BISHOP-WEED. Cal. teeth subulate, persistent. Fr. ovate, often didymous. Carp. 5-ribbed, the 3 dorsal ribs filiform, subacute, prominent, the 2 lateral united with a thick, accessory margin; intervals with single vittæ. Sds. subterete. ① Lvs. capillaceous-dissected. Umbels compound. Bracts of the invol. cleft. Fls. white.

1 **D. capillàcea** DC. Erect or procumbent; umbels 3–10-rayed; lfts. of the invol. 3—5, mostly 3-cleft; fr. ovate. Swamps near the coast, Mass. to Ga. 1—2f. June+.

2 **D. costàta** Hale (1850). Branched, erect; umbels 7–15-rayed; bracts of the invol. 10—12, 2–5-parted; lf.-segm. filiform, numerous, apparently verticillate; fr. with ribs and vittæ strongly contrasted. Swamps, Ogeechee R. and W. 1—2f, stout. Oct., Nov.

3 **D. Nuttàllii** DC. Erect, tall; umbel 15–20-rayed; invol. few-bracted, bracts entire; fr. broadly cordate-ovate. Wet prairies, Ky. and S. Slender, 2—4f.

30. CORIÁNDRUM, L. CORIANDER. Cal. with 5 conspicuous teeth. Outer petals radiant, inflex-bifid. Fr. globous. Carp. cohering, with the 5 depressed, primary ribs, and 4 secondary more prominent ones, seeds concave on the face. ① Smooth. Invol. 0 or 1-leaved. Involucels 3-leaved, unilateral.

C. satìvum L. Lvs. bipinnate, lower ones with broad-cuneate lfts., upper with linear lfts.; carp. hemispherical. Europe. 2f. Cultivated for its spicy fruit.

Order LXIV. ARALIACEÆ. Araliads.

Trees, *shrubs* or *herbs* closely allied to the Umbelworts in the leaves, inflorescence and flowers, but the *styles and cells of the* OVARY are usually more than 2 (3 to 5), cells 1-ovuled. *Fruit* baccate or dry, 3–5-celled, with 1 albuminous seed in each cell, and the petals not inflected. Fig. 242.

§ Styles and carpels 5. Umbels ∞. Flowers perfect. Leaves alternate, pinnate.............Aralia. 1
§ Styles and carpels 2—3. Umbel 1. Flowers diœcious. Leaves verticillate, palmate......Ginseng. 2
§ Styles 5, united into 1. Umb. ∞. Flowers polygamous. Lvs. simple. Climbing.......Hedera. 3

1. ARÀLIA, L. Wild Sarsaparilla. Cal. tube adherent, limb 5-toothed. Pet. 5, ovate, spreading. Stam. 5, epigynous. Styles 5, recurved above, persistent. Fr. a berry, 5-celled, 5-seeded, and 5-angled when dry. ♃ ♄ Lvs. pinnately compound, alternate. Umbels several or many, white or greenish, in summer.

* Plants low (1—2f), with few (3—7) umbels corymbously arranged..........Nos. 1, 2
* Plants tall (3—12f), with numerous umbels in racemes.....................Nos. 3, 4

1 A. nudicaùlis L. Nearly stemless, with 1 ternate-pinnate leaf longer than the scape, which bears 3 umbels at top; plant smooth. ♃ Rich, Rocky wds. E. & W. 1f.

2 A. hìspida L. *Wild Elder.* Stem shrubby and hispid-prickly at base, herbaceous above; lvs. 1–2-pinnate; lfts. ovate, cut-serrate, often lobed; umbels about 5, long-stalked, forming a terminal corymb. ♃ Dry fields. N. Eng. to Va. 1—2f. Fr. blue-blk.

3 A. racemòsa L. *Pettymorrel.* Herbaceous, smooth, branched; lvs. large, bi-ternate-pinnate, lfts. ovate, serrate; umb. small, ∞, in a panicle of racemes. ♃ Rocky woods. 3—5f. Root aromatic, an ingredient in *small-beer.*

4 A. spinòsa L. *Angelica-tree. Hercules' Club.* Shrub prickly; lvs. bi- and tri-pinnate, lfts. thick, ovate, cusp-pointed, glaucous beneath. Damp woods, O. to Fla. 8—12—20f. Trunk usually simple, bearing all the lvs. and panicles at the top.

2. GINSENG. (Panax, L. *in part.*) Diœcious-polygamous. Cal. tube adherent, limb obsolete. Pet. 5, ovate, obtuse. Stam. 5, epigynous. Sty. 2 or 3, distinct, erect. Fruit baccate, 2- or 3-seeded. ♂ Styles obsolete. ♃ Root tuberous. Stem simple, bearing 3 leaves in a whorl and one umbel. Flowers white. Fig. 242.

1 G. trifòlium. *Ground-nut.* Root a round tuber; stem low (3—6′); lvs. palmately 3–5-foliate, lfts. lance-oblong, serrate, subsessile; peduncle longer than the petioles; sty. 3; berries 3-lobed, greenish-yellow. Low woods: com. May. Root farinaceous.

2 G. quinquefòlium. *True Ginseng.* Root fusiform, fleshy; st. taller (1f+); lvs. palmately 5-foliate, lfts. ample, obovate, petiolulate, acuminate, serrate; peduncle shorter than the petioles; sty. 2; berries 2-seeded, bright red. Rocky woods. Jn.–Aug.

3. HÉDERA. L. European Ivy. Calyx 5-toothed. Pet. 5, valvate. Sta. 5. Sty. united into 1. Fr. ovoid, baccate, 5-seeded. ♄ Lvs. coriaceous, simple. Flowers green.

H. Helix. Stems woody, slender, climbing high by radicating fibres; lvs. dark green, with whitish veins, roundish ovate, 5-angled; umbels corymbed; fr. black. Europe.

Order LXV. CORNACEÆ. Cornels.

Trees and *shrubs*, seldom *herbs*, without stipules. *Leaves* opposite or rarely alternate, simple, with pinnate veinlets. *Calyx* adherent to the ovary, the limb minute, toothed or lobed. *Petals* distinct, alternate with the calyx teeth, valvate in the bud, often 0. *Stamens* same number as petals, inserted on the margin of the epigynous disk (in the ☿ flowers.) *Ovary* 1- or 2-celled. *Fruit* a baccate drupe, crowned with the calyx. Fig. 430.

1. **CORNUS,** L. DOGWOOD. Flowers perfect. Calyx limb of 4 minute segments. Pet. 4, oblong, sessile. Sta. 4. Style somewhat club-shaped. Drupe baccate, with a 2- or 3-celled nut. ♄ ♄ ♃ Lvs. entire. Flowers in cymes, often involucrate. Floral envelopes valvate in æstivation. Bark bitter, tonic. Fig. 430.

§ Cymes subtended by a 4-leaved, white involucre. Fruit red....... ....Nos. 1, 2
§ Cymes naked.—*a* Lvs. alternate, clustered at the ends of the branches....... No. 3
—*a* Lvs. opposite.—*b* Twigs and cymes pubescent ....Nos. 4, 5
—*b* Twigs, &c., glabrous.—*c* Drupes blue.Nos. 6, 7
—*c* Drupes wh...Nos. 8, 9

1 **C. Canadénsis** L. *Low Cornel.* Herbaceous, low; upper lvs. whorled, veiny, on short petioles; st. simple; invol. lvs. ovate. ♃ Damp woods, N. 4—8′. May, June.

2 **C. flórida** L. *Flowering Dogwood.* Arboreous; lvs. opposite, ovate, acuminate, entire; fls. small, in a close, cymous umbel or head, surrounded by a very large, 4-lvd. obcordate involucre. Tree in woods, 20—30f. Invol. showy. May. Bark tonic.

3 **C. alternifòlia** L. Lvs. alternate, oval, acute, hoary beneath; branches alternate, warty; drupes purple. globous. Shrub or tree, 8—20f, with a flattened top. June.

4 **C. serícea** L. Branches spreading, purplish, branchlets woolly; lvs. ovate or elliptical, acuminate, silky-pubescent beneath; cymes depressed, woolly; cal. teeth lanceolate; drupes light blue. Shrub 5—9f. Flowers yellowish white, crowded. June.

5 **C. asperifòlia** Mx. Branches erect, brownish, branchlets rough-downy; lvs. lance-oval, scabrous above, downy beneath; cymes hispid; sep. minute. W. and S. May+.

6 **C. strícta** Lam. Branches erect, brown, smooth; lvs. ovate to lanceolate, smooth and green both sides, long-acuminate; cymes loose, smooth; sepals subulate, half as long as the ovary; anth. and fr. pale blue. Swamps, Va. to Fla. 8—12f. April.

7 **C. circinàta** L. Branches warty; lvs. round-oval, white-tomentous beneath; cymes spreading, depressed; drupes light blue. Shrub 5—10f, E. and W. Lvs. large. June.

8 **C. paniculàta** L'Her. Branches erect, grayish, smooth; leaves ovate-lanceolate, acuminate, hoary beneath; cymes and drupes small, paniculate, white. 6f. May, Jn.

9 **C. stolonífera** Mx. *Red Osier.* St. often stoloniferous; branches smooth; shoots virgate, reddish-purple; lvs. broad-ovate, acute, pubescent, hoary beneath; cymes naked, flat; berries bluish-white. Small tree, E. and W. 8—10f. May, June.

2. **NYSSA,** L. TUPELO. GUM-TREE. Fls. diœcious or polygamous. ♂ Calyx tube very short, limb truncate. Pet. 5, oblong. Sta. mostly 10, inserted in the bottom of the calyx. Ov. 0. ♀ Calyx tube oblong, adherent to the 1-celled ovary, limb as in ♂. Pet. 2—5, oblong, often 0. Sty. large, stigmatic on one side. Drupe oval, 1-seeded. ♄ with small green fls. clustered on axillary peduncles, the sterile more numerous. Apr. June.

1 **N. multiflòra** Wang. Lvs. oblong-obovate, acutish or obtuse at each end, entire; the petiole, midvein, and margin villous; fertile peduncles 3-(2-5)-flowered; sty. revolute; nut short, obovate, striate, obtuse. Tree 30—70f. Drupe blue-black. †

2 **N. uniflòra** Walt. *Swamp Tupelo.* Lvs. green, oblong-ovate or ovate, long-petiolate; fertile fls. solitary, 3-bracted, on slender peduncles; sty. nearly straight; sterile fls. 5—10; drupe oblong, as large as a plum. Tree 50—80f, in swamps, S.

3 **N. capitàta** Walt. *Ogeechee Lime.* Leaves oval or oblong, short-petiolate, entire,

whitened beneath, obtuse at apex, acute at base; fertile fls. solitary, on short peduncles, downy, 3-4-bracted, with 5 petals and 10 stamens; sterile fls. 20—30 in each dense globular head; fruit large, oblong. River banks, S. 20—30f.

COHORT 2, GAMOPETALÆ,

OR MONOPETALOUS EXOGENS.—Plants having a double perianth, consisting of both calyx and corolla, the latter composed of petals partially or wholly united. (Cohort 3, page 278.)

ORDER LXVI. CAPRIFOLIACEÆ. HONEYSUCKLES.

Shrubs, rarely *herbs*, often twining with opposite leaves; no stipules. *Flowers* clustered and often fragrant, 5-parted and often irregular. *Corolla* monopetalous, tubular or rotate. *Stamens* inserted on the corolla tube, rarely one less than the lobes. *Ovary* adherent to the calyx. *Style* 1, *stigmas* 3 to 5. *Fruit* a berry, drupe, or capsule. *Embryo* small, in fleshy albumen. Figs. 67, 383, 390, 466, 471, 477.

I. LONICEREÆ. Corolla tubular, with a filiform style...(*a*)
  a Herbs.—*b* Corolla 5-lobed, the stamens but 4..............................LINNÆA. 1
      —*b* Corolla 5-lobed, the stamens 5..............................TRIOSTEUM. 2
  a Shrubs.—*c* Corolla bell-shaped, regular. Berry 4-celled, 2-seeded..........SYMPHORICARPUS. 3
      —*c* Corolla tubular, lobes unequal. Berry 2-3-celled................LONICERA. 4
      —*c* Corolla funnel-form. Capsule 2-celled, ∞-seeded..............DIERVILLA. 5
II. SAMBUCEÆ. Corolla rotate, deeply 5-lobed. Stigmas sessile...(*b*)
  b Shrubs with pinnate leaves. Berry 3-seeded..............................SAMBUCUS. 6
  b Shrubs with simple leaves. Drupe 1-seeded..............................VIBURNUM. 7

1. LINNÆ̀A, Gron. TWIN-FLOWER. Calyx tube ovate, limb 5-parted, deciduous. Bractlets at base 2. Cor. campanulate, limb subequal, 5-lobed. Sta. 4, two longer than the others. Berry dry, 3-celled, indehiscent, 1-seeded (two cells abortive). ⌊ Lvs. roundish, petiolate. Ped. filiform, erect, 2-flowered. Inhabits the N. temperate zone of both hemispheres.

L. boreàlis Gron.—Moist rocky shades, N. J. to Oreg. and N. Filiform stems 3—6f. Ped. 3, bearing at top a pair of nodding, bell-shaped, roseate, fragrant flowers. June.

2. TRIÒSTEUM, L. FEVERWORT. Calyx tube ovoid, limb 5-parted, segm. linear, nearly as long as the corolla. Cor. tubular, gibbous at base, limb 5-lobed, subequal. Sta. 5, included. Stig. capitate, lobed. Fr. drupaceous, crowned with the calyx, 3-celled, containing 3 ribbed, bony seeds. ♃ Coarse, hairy, with large, connate leaves and axillary flowers.

1 **T. perfoliàtum** L. Hirsute; lvs. oval, acuminate; fls. verticillate or clustered, sessile, brownish-purple. Rocky woods. 2—4f. Fruit orange-colored, 6″. June.

2 **T. angustifòlium** L. Hispid; lvs. lanceolate, acuminate, scarcely connate; fls. mostly solitary, short-stalked, yellowish or straw-colored. L. I. to Ill. 2—3f. May.

3. SYMPHORICÁRPUS, Dill. SNOWBERRY. Calyx tube globous, limb 4-5-toothed. Cor. funnel- or bell-shaped, the limb in 4—5 equal lobes. Sta. 4 or 5. Stig. capitate. Berry globous, 4-celled, 2-seeded (two opposite cells abortive). ♄ Leaves oval, entire. Flowers small, roseate.

1 **S. racemòsus** Mx. Fls. in terminal, loose, interrupted, often leafy rac.; cor. campanulate, densely bearded within; sty. and sta. included; berries snow-white. W. Vt. to Wis. and Pa., on rocky banks. 2—3f. A smooth, handsome shrub. July—Aug. †

2 **S. occidentàlis** R. Br. *Wolfberry.* Lvs. ovate, obtusish; spikes dense, axillary and terminal, nodding; cor. densely bearded inside; sta. and bearded style exserted: berries white. Woods, Mich. Wis. and N. 2—4f. July.

3 **S. vulgàris** Mx. Lvs. roundish-oval; spikes axillary, subsessile, capitate, and crowded; cor. lobes nearly glabrous; sta. and bearded style included; berries dark red. River banks, Penn. to Iowa, and S. 2—3f. Flowers greenish-red. July.

4. **LONICÈRA,** L. HONEYSUCKLE. WOODBINE. Calyx 5-toothed, tube subglobous. Cor. funnel- or bell-form, limb 5-cleft, often labiate. Sta. 5, exserted. Ov. 2–3-celled. Berry few-seeded. Stig. capitate. ♄ ♭ Lvs. entire, often connate. Fls. fragrant and beautiful. May–Jl. Figs. 67, 390.

§ XYLÓSTEON. Shrubs erect. Leaves never connate. Flowers in pairs...(*a*)
a Corolla gibbous at base, lobes somewhat irregular.....................Nos. 1—3
a Corolla not gibbous, lobes spreading, equal, roseate......................No. 4
§ CAPRIFÒLIUM. Shrubs climbing. Flowers sessile, mostly whorled...(*b*)
b Leaves all distinct. Corolla ringent. Cultivated exotics...............Nos. 5, 6
b Leaves (the upper pair) connate-perfoliate...(*c*)
c Corolla subequal, both tube and limb scarlet.........................No. 7
c Corolla limb ringent,—*d* tube equal (not gibbous) at base.........Nos. 8—10
—*d* tube gibbous at the base................Nos. 11, 12

1 **L. ciliàta** Muhl. *Fly Honeysuckle.* Lvs. ovate, subcordate, ciliate; cor. limb with short and subequal lobes, tube saccate at base; sty. exserted; berries distinct, red. Woods, Me. to O. and N. 3—4f. Flowers straw-yellow, on short ped. May.

2 **L. oblongifòlia** Hook. Lvs. oblong or oval, velvety beneath; cor. limb deeply bilabiate; ped. long, filiform, erect; berries connate or united into one, globous, purple. Swamps, N.Y., W. and N. 2—3f. Purple-yellow. †

3 **L. cœrùlea** L. Lvs. oval-oblong, ciliate, obtuse, villous both sides, at length smoothish; ped. short, reflexed in fruit; bracts longer than the ovaries; cor. lobes short, subequal; berries connate, deep blue. Rocky woods, Ms. N. Y. and N. 2—3f.

4 **L.** TARTÁRICA. *Tartarian Honeysuckle.* Much branched; lvs. ovate, cordate, polished; cor. segm. oblong, obtuse, purple-white. Russia. 4—10f.

5 **L.** JAPÓNICA. *Chinese Honeysuckle.* Sts. soft-pubescent; lvs. ovate and oblong; ped. axillary, 2-bracted and 2-flowered; flowers orange, &c. China. 15f.

6 **L.** PERICLÝMENUM Tourn. *Woodbine.* Lvs. deciduous, elliptical, acute, on short petioles; fls. in dense, terminal heads, red, yellow. Europe. 15f.

β. QUERCIFÒLIUM. Leaves sinuate-lobed.

7 **L. sempèrvirens** Ait. *Trumpet Honeysuckle.* Lvs. oblong, evergreen; flowers in nearly naked spikes of distant whorls; cor. trumpet-shaped, nearly regular, ventricous above. Moist groves, N. Y., W. and S. 15f. May—Sept. †

8 **L. flàva** Sims. *Yellow Honeysuckle.* Lvs. ovate, glaucous both sides; spikes terminal, of about 2 close whorls; cor. smooth, slender, bright yellow; stam. exserted. N. Y., W. and S. Shrub scarcely twining. Corolla 15′′. †

9 **L. gràta** Ait. *Evergreen Honeysuckle.* Lvs. evergreen, obovate, smooth, glaucous beneath; fls. in sessile, terminal, and axillary whorls; cor. ringent, long, slender, reddish without, yellowish within. Damp woods, M. and W. States. 12f.

10 **L.** CAPRIFÒLIUM. *Italian Honeysuckle.* Lvs. deciduous; fls. in a single, terminal verticil; lips of corolla revolute, red, yellow, white. Europe.

11 **L. parviflòra** Lam. Lvs. smooth, shining above, glaucous beneath, oblong, all sessile or connate, the upper pair perfoliate; fls. in heads of 1 or more approximate whorls; cor. glabrous, short, yellow-red: fil. bearded. Rocky woods. 8—10f.

β. ***Douglásii.*** Lvs. large, pubes. beneath, lower petiolate; fls. pubes. O., and W.

12 **L. hirsùta** Eaton. Lvs. hairy above, soft-villous beneath, veiny, broad-oval, abruptly acuminate; fls. in verticillate spikes, greenish-yellow; fil. bearded. Woods, N. Eng. to Mich. and N. 15—20f.

5. **DIERVÍLLA,** Tourn. BUSH HONEYSUCKLE. Calyx tube oblong, limb of 5 linear segm. Cor. twice as long, funnel-shaped, limb 5-cleft and nearly regular. Sta. 5. Capsular fr. 2-celled, 2-valved, crowned with the cal., many-seeded. ♄ Lvs. acuminate, serrate, deciduous. Ped. axillary. Jn.

1 **D. trífida** Mœnch. Lvs. ovate, on distinct petioles; ped. 1-3-flwd.; pod attenuate at top beneath the calyx limb. Thickets, Can. to Car. 2f, bushy. Fls. greenish-yellow.

2 **D. sessilifòlia** Buckley. Lvs. lance-oblong, sessile or subamplexicaul; peduncles 3-5-flwd., crowded in the axils above; caps. short-beaked. High Mts. N. Car. 2—4f.

6. **SAMBÙCUS,** L. ELDER. Calyx small, 5-parted. Cor. 5-cleft, segm. obtuse. Sta. 5. Stig. obtuse, small, sessile. Berry globous, pulpy, 3-seeded. ♄ ♃ Lvs. odd-pinnate or bipinnate. Fls. in cymes, white. Figs. 466, 477.

1 **S. Canadénsis** L. Woody, with large pith; lfts. 7—11, oblong-oval, acuminate, smooth; cymes fastigiate; berries dark-purple. Hedgerows, thickets: common. 8—12f. Cymes broad, white. May—July.

2 **S. pubens** Mx. Woody; lfts. lance-oval, acuminate, 5—7, downy beneath; cymes paniculate; berries scarlet. Copses. Can. to Car. 5—10f. June.—Berries rarely white. Catskill Mountains.

7. **VIBÚRNUM,** L. Calyx small, 5-toothed, persistent. Cor. rotate, limb 5-lobed, seg. obtuse. Stam. 5. Stig. 1—3, sessile. Fr. a drupe, 1-celled, 1-seeded,—a stony nut covered with soft pulp. ♄ ♄ Lvs. simple, petioles often minutely stipulate. Fls. white, in compound flat cymes, which are often radiant. Fig. 383.

§ Cymes radiant,—the outer flowers sterile and showy. Leaves stipuled ....Nos. 1, 2
§ Cymes not radiant,—the flowers all alike perfect..(*a*)
a Leaves 3-lobed, palmately 3-5-veined, with setaceous stipules.............Nos. 3, 4
a Leaves not lobed,—*b* coarsely toothed, straight-veined. Cyme stalked ...Nos. 5—7
—*b* finely and sharply serrate. Cymes sessile. June....Nos. 8, 9
—*b* entire, or nearly so.—*c* Species native....... ....Nos. 10, 11
—*c* Species exotic.............Nos. 12, 13

1 **V. lantanoìdes** L. *Hobble-bush.* Leaves round-cordate, abruptly acuminate, unequally serrate; petioles and veins rusty-downy; cyme sessile; fruit ovate. Rocky woods, N. 5f. Shoots often reclined and rooting. Handsome. May.

2 **V. Opulus** L. *High Cranberry.* Smooth; lvs. 3-lobed, 3-veined, broader than long, rounded at base, lobes acuminate, crenate dentate; petioles glandular; cymes pedunculate. Borders of woods, N. 8—12f. Fruit bright red, very acid. June.

β. ROSEUM. *Snow-ball.* Fls. all neutral, in globous cymes. †

3 **V. acerifòlium** L. *Dockmackie.* Leaves subcordate, 3-veined, lobes acuminate, acutely dentate, downy beneath; stam. exserted; fr. purple. Woods. 4—6f. June.

4 **V. pauciflòrum** Pylaie. Lvs. roundish, 5-veined at base, with 3 short lobes, serrate; cymes few-flowered; stamens included; fr. red. Mts. N.: rare. 2—3f.

5 **V. dentàtum** L. *Arrow-wood.* Smooth; lvs. round-ovate, acutely-toothed, often with downy tufts in the axils of the stout veins beneath; petioles slender; fr. blue; nut concavo-convex. Damp woods, Can. to Ga. 8—12f. Branches virgate. June.

6 **V. pubéscens** Ph. Lvs. ovate, acuminate, broadly dentate, hairy most beneath; petioles short, downy; fr. black, nut plano-convex, grooved. Rocks, Can. to Car. 2—3f.

7 **V. molle** Mx. *Poison Haw.* Downy throughout, with forked or stellate hairs; lvs. broad oval, acute, crenate dentate; fr. blue, nut grooved. Woods. Ky. to Fla. 10f. May.

8 **V. Lentàgo** L. *Sweet Viburnum.* Lvs. ovate and oval, long-acuminate, acutely and finely uncinate-serrate; petiole with undulate margins; fr. glaucous-black, oval, eatable. Rocky woods, Can. to Ga. and Ky. 10—20f. A small, handsome tree. June.

9 **V. prunifòlium** L. *Black Haw. Sloe.* Lvs. shining, oval or ovate, obtuse, sharply uncinate-serrulate; petioles slightly margined; cymes sessile; fr. blackish, oval, sweet. Woods, N. Y. to Ga. and Ill. 10—20f. A small tree. Lvs. 2—3′.

β. ***ferrugineum.*** *Possum Haw.* Lvs. lance-oval, rusty beneath; fr. tasteless. S.

10 **V. nùdum** L. Smooth; lvs. oval-oblong, or lance-oval, subrevolute at edge, entire or subcrenulate, not shining, veiny and dotted beneath; petioles not winged; cymes on short stalks. Thickets. 10—20f. Lvs. 3—4′. Drupes blue, eatable. Apr.-Jn.

β. ***angustifòlium.*** Lvs. lance-oblong, acute at both ends, subentire. S.
γ. ***cassinoides.*** Lvs. ovate or oval, denticulate, obtuse, acute, &c. N.
δ. ***ovàle.*** Lvs. small (15″), oval, obtuse, very entire. South.

11 **V. obovàtum** Walt. Lvs. small (6—12″), obovate, obtuse, entire or nearly so, subsessile, dotted; cymes small, many, sessile. River banks, S. 12f. Fruit black. Ap.

12 **V.** TINUS. *Laurestine.* Lvs. lance-ovate, entire, thick, shining. Eur. 5f.

13 **V.** ODORATÍSSIMUM. Lvs. elliptic-oblong, repand-dentate, thick. China.

ORDER LXVII. RUBIACEÆ. MADDERWORTS.

Plants with opposite or verticillate, entire leaves. *Stipules* between the petioles sometimes leaflike or 0. *Calyx tube* adherent to the ovary; limb 4- to 5-cleft. *Corolla* regular, inserted upon the calyx tube, and of the same number of divisions. *Stamens* inserted upon the tube of the corolla, equal in number and alternate with its segments. *Ovaries* 2-(rarely more)-celled. *Style* single or partly divided. *Fruit* various.

§ STELLATÆ. Herbs with the leaves in whorls of 4—8 and no stipules..(*a*)
a Flowers 4-parted. Fruit twin, separating into 2 nutlets.........GALIUM. 1
a Flowers 5-parted. Fruit twin, separable, baccate, smooth.........RUBIA. 2
§ CINCHONEÆ. Leaves opposite or in whorls of 3, with stipules.—*b* Herbs..(*c*)
—*b* Shrubs or trees..(*d*)
c Flowers in pairs, with a double ovary. Berry double.........MITCHELLA. 3
c Flowers separate. Carpels 2,—*e* each 1-seeded, separating in fruit..(*f*)
—*e* each ∞-seeded, forming a capsule..(*g*)
f Fls. in clusters.—*h* Both carpels open after separating.........BORRERIA. S. Fla.
—*h* One carpel open, the other indehiscent.........SPERMACOCE. 4
f Flowers subsolitary. Both carpels indehiscent,—*k* dry.........DIODIA. 5
—*k* baccate........ERNODEA *littoralis*. S. Fla.
g Corolla funnel-form. Seeds 16+, cup-shaped.........HOUSTONIA. 6
g Corolla wheel-shaped. Seeds 80+, angular.........OLDENLANDIA. 7
d Flowers capitate, in round, dense heads. Leaves often ternate..(*l*)
d Flowers not capitate.—*m* Carpels 2—10, each 1-seeded. In S. Florida..(*n*)
—*m* Carpels 2—5, each ∞-seeded. Florida..(*o*)
n Carpels 2—4, fewer than the lobes of the corolla. Fruit fleshy..(*p*)
n Carpels 4—10, symmetrical with the corolla lobes..(*q*)
l Flowers 4-parted, white. Fruit compacted but distinct, dry.........CEPHALANTHUS. 8
l Flowers 5-parted, red. Drupes united into a compact berry.......MORINDA *Roioc*. S. Fla.
p Leaves opposite. Racemes axillary. Carpels flattened.........CHIOCOCCA *racemosa*.
p Leaves opposite. Corymbs terminal. Carpels angular.........PSYCOTRIA.
p Leaves in 3's, linear, rigid. Racemes axillary. Shrub.........STRUMPFIA *maritima*.
q Spikes axillary, forked. Anthers on the throat of corolla.........GUETTARDA.
q Panicles axillary. Filaments inserted on the base of corolla.........ERITHALIS *fruticosa*.
o Fruit baccate, 5-celled. Corolla tubular. Stigma entire.........HAMELIA *patens*.
o Fruit baccate, 2-celled. Cor. funnel-form, white. †..*Cape Jessamine*..GARDENIA *florida*.
o Fruit capsular.—*s* Flowers in radiant cymes. A slender tree.......PINCKNEYA. 9
—*s* Flowers in cymes, not radiant, red. Shrub. †...BOUVARDIA. 10
—*s* Flowers solitary, axillary. Shrub 6—10f......EXOSTEMMA. S. Fla.

1. **GÀLIUM,** L. CLEAVERS. BEDSTRAW. Calyx limb minutely 4-toothed. Cor. rotate, 4-cleft. Sta. 4, short. Sty. 2. Carpels 2, united, separating into 2 1-seeded, indehiscent nutlets.—Herbs with slender, 4-angled stems. Verticels of 4, 6, or 8 leaves, rarely of 5.

a Flowers yellow. Leaves in whorls of about 8. Fruit smooth................ No. 1
a Flowers dull-purple. Leaves (large) in whorls of 4. Fruit hispid or not..Nos. 2—4
a Flowers white.—*b* Leaves in 4's only. Fruit dry. Panicle terminal...........No. 5
—*b* Leaves in 4's only. Fruit smooth, purple berries.......Nos. 6, 7
—*b* Leaves in 4's—6's.—*c* Fruit hispid with hooked hairs......No. 8
—*c* Fruit smooth or nearly so, dry..Nos. 9—11
—*b* Leaves in 8's, long and narrow. Fruit hispid..............No. 12

1 **G. verum** L. *Yellow Bedstraw.* Erect; lvs. in 8's, grooved, entire, rough, linear; fls. densely paniculate. ♃ Dry soils, Mass. 1—2f. Branches short. June. § Eur.

2 **G. pilòsum** Ait. Hirsute; lvs. in 4's, oval, punctate with pellucid dots; ped. several times 2- or 3-forked; fls. pedicellate, densely hispid. ♃ Dry thickets. 1—2f. June.

3 **G. circæzans** Mx. *Wild Liquorice.* Smoothish; lvs. oval or ovate-lanceolate, obtuse, 3-veined, ciliate on the margins and veins; ped. divaricate, few-flowered; fr. subsessile, nodding, hispid. ♃ Woods: common. 8—12′. July.

β. ***lanceolàtum.*** Very smooth; leaves lanceolate, 2′ long; fruit sessile.

γ. ***montànum.*** Dwarf; leaves obovate. White Mountains. (Oakes.)

4 **G. latifòlium** Mx. St. erect. smooth; lvs. lanceolate, 3-veined, very acute; ped. axillary (leafy) and terminal, about twice 3-forked; purple flowers and smooth fruit on filiform pedicels. ♃ Woody hills, Pa. S. and W. 2f. July.

5 **G. boreàle** L. Erect, smooth; lvs. linear-lanceolate, rather acute, 3-veined, smooth; fls. in a terminal pyramidal panicle. ♃ Shaded rocks, N. 1f. July.

6 **G. hispídulum** Mx. Diffuse, minutely hispid; lvs. oval, thickish, mostly acute; ped. axillary, 1–3-flwd.; fr. large, bluish-purple. ♃ Sandy. S. 2f. May—Oct.

7 **G. uniflòrum** Mx. Glabrous, cæspitous, slender; lvs. linear, acute; ped. axillary, solitary, mostly 1-flwd. bracted; fr. purple. ♃ Damp woods, S. 1f. May.

8 **G. triflòrum** Mx. Stems weak, rough on the angles; lvs. in 5's and 6's, lance-elliptic, cusp-pointed, 1-veined; ped. mostly 3-flowered. ♃ Moist woods. 1—3f. July.

9 **G. asprèllum** Mx. *Rough Cleavers.* St. diffuse, very branching, rough backward; lvs. in 6's, 5's, or 4's, lanceolate, acuminate, or cuspidate, margin and midvein retrorsely aculeate; ped. short, in 2's or 3's. ♃ Thickets, N. 2—5f. July.

10 **G. trífidum** L. *Dyer's Cleavers. Goose-grass.* St. decumbent, very branching, roughish with retrorse prickles; lvs. in 5's and 4's, linear-oblong or oblanceolate, obtuse, rough-edged; flowers mostly 3-parted. ♃ Swamps. 6′. July.—Variable.

β. ***tinctòrium.*** Ped. 3–6-flowered; parts of the flower in 4's. The root dyes red.

γ. ***latifòlium.*** Lvs. in 4's, oblanceolate; ped. 3-flowered; fls. 4-parted.

11 **G. concínnum** T. & G. St. decumbent, diffuse, scabrous; lvs. in 6's, linear, glabrous, 1-veined, scabrous upward on the margins; ped. filiform, twice or thrice 3-forked, panicled. ♃ Dry woods, Pa. Va. Ill. 1f. June.

12 **G. Aparìne** L. St. weak, procumbent, retrorsely prickly; lvs. in 8's, 7's, or 6's, linear-oblanceolate, mucronate; ped. axillary, 1–2-flwd. ① Wet thickets, N. 3–5f. Jn.

2. **RÙBIA,** Tourn. MADDER. Like Galium, but its flowers are mostly 5-merous, and its fruit always smooth and berry-like.

R. TINCTÒRUM L. Stem weak, rough backward; lvs. in 6's, lanceolate, aculeate; fls. brownish-yellow, paniculate above, with 3-forked peduncles. Europe. 3—5f.

3. **MITCHÉLLA,** L. PARTRIDGE BERRY. Flowers 2 on each double ovary. Cal. 4-parted. Cor. funnel-shaped, hairy within. Stam. 4, short,

inserted on the corolla. Stig. 4. Berry composed of the 2 united ovaries, each 4-seeded. ⌊ Smooth. Leaves opposite.

M. rèpens L.—Woods : com. Sts. creeping, 6–18′. Lvs. roundish-ovate, petiolate, evergreen. Cor. reddish-white, fragrant. Berry red, seeds (nutlets) bony. Very pretty. Jn.

4. **SPERMACÒCE,** L. Cal. 2–4-parted. Cor. tubular, limb 4-lobed. Stam. 4. Stig. 2-cleft. Fr. dry, 2-celled, crowned with the calyx, separating into 1 open and 1 indehiscent carpel. Sds. 2.—Low herbs. Stip. bristly. Flowers small, in dense, axillary, sessile whorls, or clusters, white.

1 **S. glabra** Mx. Glabrous ; lvs. lanceolate ; cal. 4-toothed ; cor. funnel-form, short, throat hairy ; anth. included in the tube ; stig. subsessile. ♃ River banks, W. 1—2f.

2 **S. Chapmánii** T. & G. Nearly glabrous ; lvs. oblong-lanceolate ; cor. funnel-form, thrice longer than the calyx ; stam. and sty. exserted. Fla. Ga. 10′.

3 **S. involucràta** Ph. Hispidly hairy ; lvs. ovate-lanceolate ; heads terminal, involucrate ; stam. exserted. Carolina (Fraser). 1f. Leaves oblique.

5. **DIÒDIA,** L. Carpels 2, rarely 3, separating, each 1-seeded and indehiscent. Fls. otherwise as in Spermacoce.—Herbs. Stip. fringed with bristles. Fls. few or solitary, axillary, sessile, small, white ; the tube often slender. Summer.

1 **D. Virgínica** L. Procumbent ; lvs. lanceolate, sessile ; corolla tube slender, with a broad, spreading limb ; sta. exserted. ♃ Damp places. 1—2f. Varies with the lvs. ovate-lanceolate ; also with the leaves more or less hairy.

2 **D. teres** Walt. Erect or ascending, nearly terete ; lvs. lance-linear, rigid, sessile ; bristles long ; cor. reddish-white, with a wide tube and short limb ; sta. scarcely exserted. ① Sandy fields, N. J. to Ill., and S. 5—18′.

6. **HOUSTÒNIA,** L. BLUETS. Cal. 4-toothed or cleft, persistent. Cor. tubular, the 4 lobes spreading. Fil. 4, inserted on the corolla. Style 1. Anth. and stig. dimorphous, that is, in some plants the former exserted and the latter included—in others the style exserted and anthers included. Caps. 2-lobed, the upper half free, cells few- (8–20)-seeded.—Herbs. Stip. connate with the petiole, entire. Fls. solitary or in cymes, white, bluish, &c.

§ Corolla salver-form, glabrous. Peduncles 1-flowered—*a* terminal..........Nos. 1, 2
—*a* axillary...........Nos. 3, 4
§ Corolla funnel-form. Peduncles ∞-flowered, cymous.—*b* Lvs. lance-ovate....No. 5
—*b* Lvs. lance-linear..Nos. 6,7

1 **H. cœrùlea** L. *Dwarf Pink. Innocence.* Cæspitous ; radical lvs. ovate-spatulate, petiolate ; sts. erect, numerous, dichotomous ; ped. filiform, 1–2-flowered. ② Moist soils. 3—5′. Flowers 5″, pale blue, with a yellow centre. May, June. Pretty.

β. minor. Branches divaricate ; flowers smaller (3—4″ wide). South.

2 **H. serpyllifòlia** Mx. Cæspitous ; sts. filiform, procumbent ; lvs. roundish-ovate, petiolate, ciliolate ; ped. terminal, very long. ♃ Mts. of Car., Tenn. 6—12′. May—Jl.

3 **H. mínima** Beck. Glabrous ; lvs. linear-spatulate ; ped. at first nearly radical, at length axillary, often not longer than the leaves ; seeds concave, smooth. ② Prairies, Ill. to La. 1—3′. Flowers rose-color, 3—4″. March—May.

4 **H. rotundifòlia** Mx. Procumbent, creeping, leafy ; lvs. roundish-oval, abrupt at base, petiolate ; ped. mostly longer than the leaves ; caps. emarginate, few-seeded. ♃ Sandy, damp places, S. In patches. 2—5′. Flowers white. Mar.—Dec.

5 **H. purpùrea** L. Erect ; lvs. 3-5-veined, closely sessile ; cymes 3–7-flowered, often clustered ; calyx segm. lance-linear, longer than the pod. ♃ Penn., S. and W. 1f. White-purple. May—July. Very pretty.

6 H. longifòlia Gaert. Radical leaves oval-elliptic, cauline linear or lance-linear, 1-veined; fls. in small, paniculate cymes; sepals shorter than the pod.
β. ***tenuifòlia.*** Much branched; leaves very narrow; ped. filiform.
γ. ***ciliolàta.*** Leaves oblong-linear, obtuse, often ciliate; branches erect. N. and W.,—all the forms, on river banks and prairies. 1f. June, July.

7 H. angustifòlia Mx. Slender, tall, strictly erect; lvs. narrowly linear, 1-veined; fls. very numerous, short-pedicelled, in compact, terminal cymules; cal. lobes subulate; caps. obovoid or top-shaped. ♃ Prairies, Ill. to La. 1—2f. June—July.

7. OLDENLÁNDIA, L. Calyx 4- or 5-lobed, persistent. Cor. funnelform, with a short tube, little longer than the calyx, 4–5-lobed. Sta. 4—5. Sty. short or 0. Stig. 2. Caps. wholly adherent. Seeds very numerous and minute (40—60 in each cell).—Herbs erect or prostrate. Stipules with 2—4 subulate points each side. Flowers small, axillary, white.

1 O. glomeràta Mx. *Creeping Greenhead.* Stems assurgent; lvs. ovate-lanceolate, pubescent, narrowed at the base; fls. glomerate in the axils and terminal; cor. shorter than the leafy calyx teeth. Swamps, N. Y. to La. 1—12′. June—Sept.

2 O. Bóscii. Erect, much branched; lvs. lance-linear, acute; fls. subsolitary, axillary, sessile. ♃ Banks of rivers, S. 6—10′. Corolla purplish. July, Aug.

3 O. Hàlei. Weak, diffuse, succulent; lvs. oval-oblong, acute; fls. subsolitary, white, pentamerous. ♃ River banks, Fla. to La. 8—10′.

8. CEPHALÁNTHUS, L. BUTTON BUSH. Calyx limb 4-toothed. Cor. tubular, slender, 4-cleft. Sta. 4. Sty. much exserted.—Shrubs with opposite lvs. and short stip. Fls. in globous heads, without an involucre.

C. occidentàlis L. Lvs. opposite and in 3's, oval, acuminate, entire, smooth; heads pedunculate. Margins of streams. 6f. Heads nearly 1′ diam. July.

9. PÍNCKNEYA, Mx. Calyx 5-parted, one of the segm. in the outer flowers changed to a large, rose-colored bract. Cor. tubular, lobes 5, spreading. Sta. 5, exserted. Stig. 2-lobed. Caps. 2-valved, ∞-seeded. ♄ Lvs. large, ovate. Cymes corymbous, terminal, splendidly *radiant.* Cor. purplish.

P. pubéscens Mx.—Swamps, S.: common. 15—25f. Pods size of a hazel-nut. May, June.—In cultivation it is a shrub, flowering when 8—12f high.

10. BOUVÁRDIA, H. K. Calyx toothleted between its 4 lobes. Cor. tubular. Anth. 4, included. Caps. 2-partible, ∞-seeded. Sds. margined. ♄ Glabrous. Leaves lanceolate, coriaceous.

1 B. TRIPHÝLLA. Lvs. in whorls of 3's; cymes corymbed; fls. scarlet. Mexico. 2f.
2 B. VERSÍCOLOR. Lvs. opp.; cymes racemed; cor. clavate, curved, red and purp. S. Am.

ORDER LXVIII. VALERIANACEÆ. VALERIANS.

Herbs with opposite leaves and no stipules. *Calyx* adherent, the limb either membranous or resembling a pappus. *Corolla* tubular or funnelform, 4–5-lobed, sometimes spurred at base. *Stamens* distinct, inserted into the corolla tube alternate with, and generally fewer than its lobes. *Ovary* inferior, with one perfect cell and two abortive ones. *Seeds* solitary, pendulous, in a dry, indehiscent pericarp.

1. VALERIÀNA, L. VALERIAN. Calyx limb at first very small, involute, at length evolving a plumous pappus. Cor. funnel-form, regular, 5-cleft. Sta. 3. Fruit 1-celled, 1-seeded. ♃ Leaves opposite, mostly pinnately divided. Flowers in close cymes. June, July.

§ Stems climbing and twining. Leaves ternately divided, long-stalked.........No. 1
§ Stem erect.—*a* Leaves and leaflets broad, somewhat ovate. Root fibrous...Nos. 2, 3
—*a* Leaves and leaflets narrow, nearly linear. Root fusiform........No. 4
† Garden exotics, native of Europe...............Nos. 5—8

1 V. scandens L. Glabrous; lfts. ovate, thin, entire, pointed; cymes diffusely panicled, axillary and terminal; corolla very short. E. Fla. 4—6f, slender.

2 V. pauciflòra Mx. Rt. lvs. ovate, cordate, crenate-serrate; cauline of 3—7 ovate, toothed lfts.; cor. tube long (7—8′′) and slender, rose-white. O. to Va. and W. 1—2f.

3 V. sylvática Richd. Rt. lvs. ovate or oblong, never cordate, entire; cauline of 5—11 lance-ovate, entire lfts.; cor. short (3—4′′), roseate. Swamps, Vt. and W.

4 V. édulis N. Smooth, thickish; root lvs. linear-spatulate, entire; cauline of 3—7 lance-linear, acute segm., the margins ciliate; cor. white, short (2—3′′), in a dense panicle. Low grounds, O. Wis. and W. The thick root is edible. 1—3f.

5 V. DIOÏCA. Root lvs. undivided; cauline pinnatifid; fls. panicled, ♂ ♀, blush. 1f.

6 V. PHU. Root lvs. undivided; cauline pinnate; fls. corymbed, ☿, white. 3f.

7 V. OFFICINÀLIS. Lvs. all pinnate and toothed; fls. corymbed, blush-colored. 3f.

8 V. PYRENÀICA. Lvs. cordate, toothed, upper pinnate; fls. corymbed, pink-red. 1—2f.

2. VALERIANÉLLA, Mœnch. DC. Calyx limb obsolete. Cor. tube short, not spurred, limb 5-lobed, regular. Sta. 3. Stig. 3-cleft or entire. Fr. 3-celled, 1-seeded, 2 cells empty. ① Stems forked above. Lvs. opposite, oblong or linear, entire or toothed, sessile. Fls. in dense, terminal cymelets. The specific characters are afforded mainly by the fruit. (Fedia, Gaert. T. & G.)

* Flowers pale blue. Fruit orbicular, fertile cell larger than the empty..........No. 1
* Flowers white.—*a* Fruit ovoid, fertile cell larger than the 2 empty.........Nos. 2, 3
—*a* Fruit subglobous, empty cells larger than the fertile....Nos. 4, 5

1 V. olitòria Mœnch. *Lamb Lettuce.* Fr. finally broader than long; fertile cell with a corky back, seed laterally compressed. Fields, N. Y. to Va.: rare. 8—12′. June.

2 V. Fagopỳrum. Fruit smooth, ovoid-triangular, the empty cells at the obtuse angle, and no groove between; fls. large (1½′′). W. N-Y. to Wis. 1f. June.

3 V. radiàta Dufr. Fruit pubescent, ovoid, somewhat 4-angled, 1-toothed at apex; empty cells with a groove between; fls. small (½′′). Pa. to Mich., and S. 9′.

4 V. umbilicàta. Fr. inflated, apex 1-toothed, the anterior face deeply umbilicate and perforated into the empty cells, which are much larger. Ohio (Sullivant).

5 V. patellària. Fruit orbicular, flattened, the empty cells widely divergent, at length forming a winged margin to the fertile cell. Ohio (Sullivant).

ORDER LXIX. DIPSACEÆ. TEASELWORTS.

Herbs with whorled or opposite leaves and no stipules. *Flowers* in dense heads, surrounded by an involucre as in Compositæ. *Calyx* adherent, pappus-like, surrounded by a special scarious involucel. *Corolla* tubular. *Stamens* 4, alternate with the lobes of corolla, and distinct. *Ovary* inferior, 1-celled, 1-ovuled. *Style* 1, simple. *Fruit* dry, indehiscent, with a single suspended seed. Fig. 441.

1. DÍPSACUS, L. TEASEL. Fls. in heads. Involucre many-leaved.

Involucel 4-sided, closely investing the calyx and fruit. Cor. 4-cleft, lobes erect. Fruit 1-seeded, crowned with the calyx. ② Stout, prickly. Leaves connate at base. Hds. oblong, the middle zone of florets first expanding.

1 **D. sylvéstris** Mill. *Wild T.* Lvs. sinuate or jagged; bracts slender, erect, pungent, longer than the heads; chaff pungent, with a straight point. Waysides and hedges, Mass. to Cal.! 5f. Flowers bluish. July. § Europe.

2 **D.** FULLÒNUM. *Fullers' T.* Leaves serrate or entire; bracts of the involucre spreading; chaff rigid, erect, with sharp, hooked points. Europe. 4f. July.

2. **SCABIÒSA,** L. SCABISH. Fls. in heads. Involucre many-leaved. Involucel nearly cylindrical, with 8 little excavations. Calyx limb consisting of 5 setæ, sometimes partially abortive. ♃ Mostly European.

S. ATROPURPÙREA. *Mourning Bride.* Leaves pinnatifid and incised; heads radiant; receptacle cylindric. India? 3f. Purple. Beautiful.

β. CANDIDÍSSIMA. Flowers pure white.—There are many other varieties.

ORDER LXX. COMPOSITÆ. ASTERWORTS.

Plants herbaceous or shrubby, with compound flowers (of the old botanists), *i. e.*, the flowers in dense heads (capitula) surrounded by an involucre of many bracts (scales), with 5 united anthers, and the fruit an achenium (cypsela). *Leaves* alternate or opposite, exstipulate, simple, yet often much divided. *Flowers* (florets) ∞, crowded, sessile, on the receptacle with or without pales (chaff). *Calyx* adherent, the limb wanting or divided into bristles, hairs, &c. (pappus). *Corolla* tubular, of 5 lobes with a marginal vein, often ligulate or bilabiate. *Stamens* 5, alternate with the lobes of the corolla, anthers cohering into a tube. *Ovary* 1-celled, with 1 erect ovule. *Style* single, with 2 stigmas at summit. *Fruit* a cypsela (§ 151), dry, indehiscent, 1-seeded, often crowned with a pappus. (See § 104, 348, 362.)

Figs. 68, 72–7, 103, 146, 160, 178, 261, 319, 341–6, 387–8, 433–4, 446–8, 492.

An immense and perfectly natural assemblage, of about 1000 genera and 9000 species. In the United States very few are shrubby.

The flowers are perfect or variously diclinous. If the head has all its flowers of one kind, whether ☿, or ♂, or ♀, it is *homogamous;* if of different kinds, it is *heterogamous.*—The following are De Candolle's Suborders and Tribes, with a convenient artificial analysis appended.

I. TUBULIFLORÆ.—*Corolla of the perfect flowers tubular, 5-lobed.* **(A.)**

TRIBE 1, VERNONIACEÆ. Branches of the style long, slender, terete, and hispid all over. Heads discoid. Flowers all alike, perfect.......Nos. 1—3

TRIBE 2, EUPATORIACEÆ. Branches of the style clavate, obtuse, flattened, minutely pubescent. Heads discoid. Flowers all alike, perfect.......Nos. 4—15

TRIBE 3, ASTEROIDEÆ. Branches of the style flat, linear, downy above and opposite the distinct, stigmatic lines, appendaged at top. Heads discoid or radiate ....Nos. 16—34

TRIBE 4, SENECIONIDÆ. Branches of the style linear, fringed at the top, truncate or extended into a conical, hispid appendage.......Nos. 35—89

TRIBE 5, CYNAREÆ. Style thickened or node-like at top. Branches not appendaged, the stigmatic lines not prominent, reaching the apex.......Nos. 90—98

II. LIGULIFLORÆ.—*Corollas all ligulate (radiant), flowers all perfect.* **(B.)**

TRIBE 6, CICHORACEÆ. Branches of the style long, obtuse, pubescent all over; stigmatic lines commencing below their middle. Juice milky.......Nos. 99—115

III. LABIATIFLORÆ.—***Corolla of the perfect flowers bilabiate.*** **(C.)**

TRIBE 7, MULISIACEÆ. Style nearly as in Cynareæ, the branches obtuse, very convex outside, minutely downy at the top..No. 116

A. SUBORDER TUBULIFLORÆ.

§ Heads discoid, that is, without rays...(1)

§ Heads radiate, *i. e.*, the outer flowers ligulate...(8)

1 Receptacle naked, *i. e.*, with no pales or bristles among the flowers...(2)

1 Receptacle chaffy, bearing pales among the flowers...(6)

1 Receptacle bearing bristles, or deeply alveolate (honeycombed)...(7)

2 Pappus a circle of 5—20 chaffy scales...(*a*)

2 Pappus none, or a short, toothed margin...(*b*)

2 Pappus composed of many capillary bristles...(3)

3 Leaves opposite. (Heads homogamous)...(*d*)

3 Leaves alternate...(4)

4 Heads homogamous,—flowers all perfect...(*c*)

4 Heads heterogamous,—flowers not all perfect...(5)

5 Scales herbaceous, often deciduous...(*e*)

5 Scales scarious, persistent, often colored...(*f*)

6 Leaves alternate...(*g*)

6 Leaves opposite...(*h*)

7 Pappus none, or consisting of scales...(*i*)

7 Pappus composed of many bristles...(*j*)

8 Receptacle naked (not chaffy), or (in No. 67) deeply honeycomb-celled...(9)

8 Receptacle chaffy, with pales among the flowers...(13)

9 Pappus of 5—12 scales, which are 1-awned or (in No. 62) cleft-bristly...(*k*)

9 Pappus none, or of a few short awns...(*l*)

9 Pappus of many capillary bristles...(10)

10 Rays cyanic, in a single row...(*m*)

10 Rays cyanic, in several rows...(*n*)

10 Rays yellow, in about one row...(11)

11 Pappus double, or of very unequal bristles...(*o*)

11 Pappus simple, the bristles all similar...(12)

12 Involucre scales imbricated, the outer shorter...(*p*)

12 Involucre scales equal, not imbricated...(*r*)

13 Disk and ray flowers both fertile, the latter pistillate...(14)

13 Disk flowers sterile, ray flowers fertile...(*u*)

13 Disk flowers fertile, ray flowers sterile...(15)

14 Rays yellow...(*s*)

14 Rays cyanic...(*t*)

15 Achenia obcompressed, often beaked...(*v*)

15 Achenia compressed laterally, or not at all...(*x*)

a Corolla lobes one-sided. Head large, many-flowered ....STOKESIA. 2

a Corolla lobes one-sided. Heads 4-5-flowered, aggregated..........................ELEPHANTOPUS. 3

a Corolla lobes equal.—Leaves opposite. Pappus awned..........................AGERATUM. 4

—Leaves whorled. Pappus obtuse..........................SCLEROLEPIS. 5

—Leaves alternate.—Pappus scales 8—10..................PALAFOXIA. 65

—Pappus scales 12—20..................HYMENOPAPPUS. 66

b Leaves opposite. Flowers diœcious, obscure...AMBROSIA. 47

b Leaves alternate.—Flowers yellow. Disk conical..................................MATRICARIA. 73

—Flowers yellow. Disk convex...................................TANACETUM. 74

—Flowers whitish.—Erect, leafless above...........................ADENOCAULON. 15

—Fls. *8* ....ARTEMISIA. 76......Fls. ☿ ....HUMEA. (82 *a*) 116

—Low and depressed...........................SOLIVA. 77

c Scales of the involucre in one row.—Flowers cyanic..............................CACALIA. 86

—Flowers yellow.—Receptacle flat..........SENECIO. 87

—Receptacle convex......RUGELIA. 89

c Scales imbricated.—Flowers yellow..BIGELOVIA. 27

—Flowers whitish..................EUPATORIUM, 10, and......KUHNIA. 8

—Flowers purple.—Pappus simple. Involucre not radiate...LIATRIS. 7

—Pappus simple. Involucre dry, radiate...RHODANTHE. 82

—Pappus double..........................VERNONIA. 1

d Achenia 10-striate. Flowers purple	BRICKELLIA.	9
d Achenia 5-angled.—Receptacle conical. Flowers blue	CONOCLINIUM.	12
—Receptacle flat.—Scales 4 or 5	MIKANIA.	11
—Scales 8—20	EUPATORIUM.	10
e Shrubs. Flower diœcious, the ♀ and ♂ in different heads	BACCHARIS.	34
e Herbs.—Stem winged. Heads spicate	PTEROCAULON.	35
—Stem wingless.—Heads, corymbous, purplish	PLUCHEA.	33
—Heads paniculate.—Pappus reddish	CONYZA.	31
—Pappus white	ERECHTITES.	85
f Receptacle chaffy except in the centre	FILAGO.	80
f Receptacle naked.—Heads diœcious	ANTENNARIA.	79
—Heads heterogamous.—Involucre erect	GNAPHALIUM	78
—Involucre radiate	HELICHRYSUM.	83
g Scales dry, fadeless. Pappus 4 teeth. Stem winged	AMMOBIUM.	81
g Scales dry, fadeless. Pappus of scale-like awns	XERANTHEMUM.	84
g Scales herbaceous.—Flowers diœcious. Fruit a burr	XANTHIUM.	48
—Flowers all perfect.—Pappus of 5 or 6 scales	MARSHALLIA.	69
—Pappus of many bristles	CARPHEPHORUS.	6
h Flowers yellow. Pappus 2 inversely hispid awns	BIDENS.	59
h Flowers yellow. Pappus 2 erectly hispid awns	COREOPSIS.	58
h Flowers whitish,—diœcious. Anthers yellowish	AMBROSIA.	47
—monœcious. Anthers yellow	IVA.	46
—all perfect. Anthers black	MELANTHERA.	49
i Outer scales of the invol. leafy. Pappus none	CARTHAMUS.	94
i Outer scales pectinate or ciliate-fringed, or entire	CENTAUREA.	93
j Pappus plumous. Achenia obovate	CYNARA.	90
j Pappus plumous. Achenia oblong	CIRSIUM.	97
j Pappus scabrous,—triple, each row by 10's	CNICUS.	95
—simple.—Scales spinescent	ONOPORDON.	96
—Scales hooked	LAPPA.	98
k Leaves opposite. Pappus scales deeply cleft into bristles	DYSODIA.	62
k Leaves alternate.—Receptacle with deep horny cells	BALDWINIA.	68
—Receptacle with shallow fringed cells	GAILLARDIA.	63
—Receptacle areolate.—Rays all yellow	HELLENIUM.	67
—Rays spotted at base †	GAZANIA.	64
l Leaves opposite. Involucre double, outer 8 united	DAHLIA.	23
l Leaves opposite. Involucre single. Scales united	TAGETES.	91
l Leaves alternate.—Pappus of a few short awns or bristles	BOLTONIA.	24
—Pappus a membranous margin	MATRICARIA.	73
—Pappus 0.—Rays fertile, disk sterile	CALENDULA.	91
—Flowers all fertile.—Involucre scales equal	BELLIS.	22
—Invol. broad, flat	LEUCANTHEMUM.	72
—Invol. hemispherical	CHRYSANTHEMUM.	75
m Rays 4 or 5. Involucre oblong, imbricated. Cypsela very silky	SERICOCARPUS.	17
m Rays 5—75. Involucre loosely or closely imbricated. Pap. simple, copious	ASTER.	18
m Rays 8—12. Involucre imbricated. Pappus double, the outer very short	DIPLOPAPPUS.	19
m Rays 40—200. Involucre scarcely imbricated, scales nearly equal	ERIGERON.	20
n Flowers diœcious, purplish. Leaves all radical	NARDOSMIA.	14
n Flowers all fertile.—Native. Scales subequal, flat. Fruit smoothish	ERIGERON.	20
—Exotic. Scales subequal, keeled. Fruit hairy	AGATHEA.	16
—Exotic. Scales imbricated. Pappus double	CALLISTEPHUS.	21
o Pappus double in the disk flowers, none in the rays	HETEROTHECA.	29
o Pappus double in both disk and ray flowers	CHRYSOPSIS.	30
p Heads large, about 20-rayed. Pappus in one row	INULA.	32
p Heads very small, 1-15-rayed.—Pappus 1 row, shorter than achenia	BRACHYCHÆTA.	25
—Pappus 1 row, tawny, longer than achenia	ISOPAPPUS.	28
—Pappus irregularly 2-rowed, white	SOLIDAGO.	26
r Head solitary, on a scape with alternate bracts	TUSSILAGO.	13
r Heads corymbed, &c.—Leaves alternate	SENECIO.	87
—Leaves opposite	ARNICA.	88
s Shrubby. Pappus 4-toothed, obscure	BORRICHIA.	36
s Herbaceous.—Scales (the 4 outer) united into a cup	TETRAGONOTHECA.	52

—Scales distinct.—Cypselæ 4-angled. Pappus 0	HELIOPSIS.	51
—Cypselæ flattened. Pappus 0	SPILANTHES.	60
—Cypselæ flat, with a 2-awned pappus	VERBESINA.	61
t Leaves alternate. Pappus none. Achenia terete	ANTHEMIS.	70
t Leaves alternate. Pappus none. Achenia obcompressed	ACHILLEA.	71
t Leaves opposite.—Pappus none	ECLIPTA.	37
—Pappus of fringed scales	GALINSOGA.	38
—Pappus of the disk a single awn, of the ray 0	ZINNIA.	50
u Leaves opposite. Rays yellow. Pappus none	POLYMNIA.	39
u Leaves opposite. Rays yellow. Pappus a 2- or 3-toothed crown	CHRYSOGONUM.	40
u Leaves alternate.—Rays whitish, very short, 5 only	PARTHENIUM.	45
—Rays yellow, disk dark-purple. Leaves entire	MADIA.	43
—Rays yellow, disk brown. Leaves cut	SPHENOGYNE.	44
—Rays and disk yellow.—Fruit winged	SILPHIUM.	41
—Fruit wingless	BERLANDIERA.	42
v Cypsela with erectly hispid awns, or awnless, never rostrate	COREOPSIS.	58
v Cypsela with retrorsely hispid awns, often attenuated above	BIDENS.	59
x Rays white, spreading. Pappus none	ANTHEMIIS.	70
x Rays purple, pendent. Pales sharp, elongated	ECHINACEA.	53
x Rays yellow.—Pappus none. Cypsela quadrangular	RUDBECKIA.	54
—Pappus none. Cypsela compressed	LEPACHIS.	55
—Pappus of 2 awns.—Fruit wingless	HELIANTHUS.	56
—Fruit broad-winged	ACTINOMERIS.	57

B. SUBORDER LIGULIFLORÆ.

§§ Pappus none, or consisting of little scales...(*a*)
§§ Pappus double (of scales and bristles), or simple and plumous...(*b*)
§§ Pappus composed of capillary bristles, not plumous...(*)
  * Achenia terete or angular, not flattened...(*c*)
  * Achenia evidently flattened...(*d*)

a Flowers yellow. Pappus none. Heads paniculate	LAMPSANA.	99
a Flowers yellow. Pappus none. Heads solitary or umbellate	APOGON.	100
a Flowers blue.—Pappus of many little scales. Receptacle naked	CICHORIUM.	101
—Pappus of 5 scales. Receptacle chaffy	CATANANCHE.	107
b Flowers purple. Feathery pappus on a long filiform beak	TRAGOPOGON.	105
b Flowers white. Feathery pappus on a short beak or sessile	LEONTODON.	104
b Flowers yellow.—Pappus of many bristles with the scales	CYNTHIA.	103
—Pappus of 5 bristles and 5 scales	KRIGIA.	102
c Flowers whitish or purplish, mostly nodding. Stem leafy	NABALUS.	108
c Flowers rose-purple, erect. (Stem almost leafless)	LYGODESMIA.	109
c Flowers yellow.—Achenia long-beaked. Pappus white	TARAXACUM.	112
—Achenia long-beaked. Pappus reddish	PYRROPAPPUS.	111
—Achenia not beaked.—Pappus dull-white or tawny	HIERACIUM.	106
—Pappus bright white	TROXIMON.	110
d Achenia contracted into a slender beak. Flowers mostly yellow	LACTUCA.	113
d Achenia scarcely beaked.—Flowers mostly blue	MULGEDIUM.	114
—Flowers yellow. Pappus silky	SONCHUS.	115

C. SUBORDER LABIATIFLORÆ.

§§§ Head radiate, solitary, nodding in bud. Pappus capillary	CHAPTALIA.	117

1. **VERNÒNIA,** Schreb. IRON WEED. Fls. all tubular, perfect. Invol. of ovate, imbricated scales, the inner longest. Recept. naked. Pap. double, the exterior chaffy, the interior capillary. ♃ ♄ Leaves alternate. Fls. purple (in our species). Cymes corymbed. Figs. 446–8.

§ Scales of the involucre all obtuse and closely appressed. Stem tall, grooved. ..No. 1
§ Scales of the invol. (usually all)—*a* with slender, flexuous points... .... .Nos. 2, 3
—*a* with acute or mucronate points. South...Nos. 4–6

1 **V. fasciculàta** Mx. Lvs. narrowly lanceolate, serrulate; cyme fastigiate; invol. ovoid-bell-shaped, half as long as the showy, dark-purple fls. Com. W. 3—10f. Jl. Aug.

2 **V. Novaboracénse** Willd. Lvs. many, lanceolate, serrulate, rough; cyme fastigiate; invol. scales filiform at the ends, or the upper cuspidate. Com. 3—6f. Aug.

3 **V. scabérrima** N. Lvs. all sessile, lanceolate and lance-linear, margins revolute, subentire; hds. 20-30-flowered; scales lanceolate, ciliate, protracted into long, flexuous points. Pine-barrens, S. 2—3f. June—August.

4 **V. angustifòlia** Mx. Lvs. linear and lance-linear, margins revolute; hds. 10-15-flowered; lower scales some filiform-pointed. Barrens, S. 2f. September.

5 **V. ovalifòlia** T. & G. Lvs. many, the lower oval or oblong; invol. bell-form, 20-flowered; scales acute or mucronate, short. Dry woods, Fla. 2—3f. June, July.

6 **V. oligophýlla** Mx. Lvs. mostly radical, oblong-obovate, the 2 or 3 cauline bract-like, lanceolate; scales spreading, acuminate. S. 2f. June, July.

2. **STOKÈSIA**, L'Her. Fls. all tubular, the marginal larger, ray-like, irregular; scales of the invol. imbricated, in several rows, the outer spinulous and leaf-like. Recept. naked. Cypsela 4-angled. Pap. of 4 or 5 awn-like, rigid, deciduous scales. ♃ Erect, with a downy stem, alternate lvs., and large terminal heads of showy blue flowers.

S. cȳama L'Her.—Wet woods, S. Car. and W.: very rare. 2f. Lvs. glabrous, entire. Bracts spinulous at base, gradually becoming scales. †

3. **ELEPHÁNTOPUS**, L. ELEPHANT'S-FOOT. Heads 3–5-flowered, glomerate into a compound head with leafy bracts. Fls. all ☿ and equal. Invol. scales about 8, in 2 series. Cor. deeply cleft on one side. Fr. ribbed. Pap. chaffy-setaceous. ♃ Erect, with large, alternate, subsessile lvs. Cor. purple or white. July—September.

1 **E. Caroliniànus** Willd. St. much branched, leafy, hairy; lvs. somewhat hairy, ovate or oval-oblong, obtuse, crenate-serrate. Dry soils, Pa. S. and W. 2f.

2 **E. tomentòsus** L. St. hirsute, nearly leafless, simple or dichotomous above; root lvs. hirsute-tomentous, oblong-obovate. Woods, S. 1—2f. Flowers whitish.

4. **AGERÀTUM**, L. Heads ∞-flowered, ☿, discoid. Scales linear, imbricated, pointed. Recept. naked. Corollas all tubular. Cyp. 5-angled, narrowed at base. Pap. 5 or 10, chaffy, awned scales. ①② Mostly tropical, with opposite, petioled lvs. and corymbed heads. Fig. 75.

A. conyzòides L. Branching; lvs. ovate, tooth-crenate, acute or cordate at base, somewhat rugous; pap. scales 5, as long as the corolla, but much shorter than the conspicuous styles. Wet places, near Savannah. 1—1½f. Blue or white. Apr.—Jn.
β. MEXICÀNA. Lvs. all, or nearly all, cordate. Fls. light blue, perpetual. †

5. **SCLERÓLEPIS**, Cass. Head ∞-flowered, ☿, discoid. Scales equal, linear, in 2 series. Recept. naked. Cor. 5-toothed. Styles much exserted. Cyp. 5-angled, crowned with a cup-shaped pappus of 5 obtuse, horny scales. ♒ Glabrous, simple, with 1—3 terminal hds. Lvs. verticillate. Flowers purple.

S. verticillàta Cass. ♃ In shallow water, N. J. to Fla. Erect, 1—2f, from a decumbent base. Lvs. lin., entire, 1′, in whorls of 5's and 6's. Hds. mostly solitary. Jl.—Sep.

6. **CARPHÉPHORUS**, Cass. Heads (about 20-flowered), involucre, flowers, and fruit as in Liatris. Recept. chaffy. Pales narrow, 3-veined,

rigid, shorter than the flowers. ♃ Sts. simple, leafy, corymbous at top, with middle-sized heads of purple flowers in Autumn. (Liatris, Mx. Ell.)

* Scales of the involucre acute, downy-tomentous. Leaves acute ....Nos. 1, 2
* Scales of the involucre rounded-obtuse, nearly glabrous. Leaves obtuse ..Nos. 3, 4

1 **C. pseudo-liàtris** Cass. Lvs. linear-subulate, rigid, closely appressed to and covering the stem; hds. few, rac. or cor.; plant downy, erect. W. Fla. to La. 2f.

2 **C. tomentòsus** T. & G. Lvs. lanceolate, petiolate, the cauline lance-ovate, sessile, small, erect; plant tomentous, corymb loose. Swamps, S. 2f.

3 **C. bellidifòlius** T. & G. Low, nearly smooth, tufted; lvs. spatulate below, linear above; hds. few, in a loose corymb; scales herbaceous. Sand hills, N. Car. 1f.

4 **C. corymbòsus** T. & G. St. single, stout, erect, hairy; lvs. oblanceolate, the upper oblong, sessile; corymb dense; scales scarious-edged. Swamps, S. 3f.

7. **LIÀTRIS,** L. Fls. all ☿, tubular. Invol. oblong, imbricate. Recept. naked. Pap. of ∞ capillary bristles. Cyp. tapering to the slender base, 10-striate. Styles much exserted. ♃ With simple, erect stems, alternate, entire lvs., and handsome rose-purple flowers in spicate, racemed, or paniculate heads. August—November.

§ Heads in a corymb or thyrse-like panicle. Root fibrous, no tuber............Nos. 1–3
§ Heads in a spike or a simple raceme. Root a roundish tuber..(*a*)
a Scales of the involucre colored and petaloid at their lengthened ends...... No. 4
a Scales not petaloid, green or slightly tinged at the end..(*b*)
b Pappus evidently plumous. Corollas (13 to 60) hairy within..........Nos. 5, 6
b Pappus evidently plumous. Cor. (3 to 5) smooth within. South....Nos. 7, 8
b Pappus only barbellate (smooth to the naked eye)..(*c*)
c Heads 20–40-flowered, roundish, with rounded scales.... ....No. 9
c Heads 7–15-flowered.—*d* Scales all similar, obtuse... ....Nos. 10, 11
—*d* Scales all, or the inner only, acute.. ..Nos. 12, 13
c Heads 3–7-flowered,—*e* in a regular spike, raceme (or panicle)...Nos. 14–16
—*e* in one-sided spikes or racemes.......... ...No. 17

1 **L. odoratíssima** Willd. *Vanilla Plant. Deer's Tongue.* Smooth; lvs. obovate-spatulate, obtuse, thick, the cauline oblong; heads 7–8-flowered, in a loose, compound corymb. Pine-barrens, Va. to Fla. 1—3f. Used to perfume tobacco.

2 **L. paniculàta** Willd. Viscid-tomentous; lvs. lance-spatulate, the cauline small, pointed; hds. 5-flwd., in an oblong, dense panicle, white-purple. Damp. S. 2—3f.

3 **L. fruticòsa** N. Shrubby, smooth; lvs. obovate, fleshy, veinless, the lowest opposite; hds. corymbed, 5-flowered; scales lanceolate, acute, dotted. E. Fla. Lvs. 1′.

4 **L. élegans** Willd. Hairy above; lvs. oblanceolate, cauline linear; rac. dense, 1f; hds. 4–5-flowered, scales longer and more showy than the flowers. Woods, S. 4f.

5 **L. squarròsa** Willd. *Blazing Star.* St. 2—3f; lvs. linear, the lower narrowed at base; rac. leafy; hds. few, 15–40-flowered, subsessile, scales squarrous-spreading, the outer leafy, inner sharp-pointed. Dry soils, Penn. to Fla. and W.

6 **L. cylindràcea** Mx. St. low (6—18′), slender; lvs. linear, rigid; hds. few, cylindrical, 15–20-flowered; scales short, rounded, appressed. Dry. N. Y. and W.

7 **L. Boykínii** T. & G. Lvs. linear, dotted; hds. 3 or 4-flowered in a close, virgate spike; scales pointed and spreading at the tips. Near Columbus, Ga. 1—2f.

8 **L. tenuifòlia** L. Lvs. narrowly linear or filiform; hds. 5-flwd., crowded in a long raceme; scales oblong, obtuse-mucronulate. Woods, S. 2—4f. Fine.

9 **L. scariòsa** L. *Gay Feather.* Scabrous-pubescent; lvs. lanceolate, the lower on long petioles, upper linear; hds. remotely racemed; invol. hemispherical, with obovate, very obtuse scales. Dry soils. 4—5f. Beautiful.

10 **L. spicàta** Willd. Lvs. lance-linear, the lower narrowed at base; hds. sessile, in a long spike; scales oblong, obtuse, narrow-margined. N. J., W. and S. 2—5f.

11 **L. graminifòlia** Willd. Leaves linear, 1-veined; hds. mostly pedicellate. rac. rarely paniculate below; invol. acute at base, scales obovate-spatulate, obtuse, appressed; cyp. hairy. Sandy soils, N. J. and S. Variable.

12 **L. pilòsa** Willd. Downy and hairy, stout; lvs. linear and lance-linear; hds. loosely racemed, scales linear-oblong, obtuse, the inner linear. N. Car. Rare.

13 **L. heterophýlla** R. Br. Glabrous; lvs. lanceolate, the upper greatly diminished; hds. spiked, scales lance-acuminate, spreading. N. Car. to Ga. Rare.

14 **L. grácilis** Ph. Pubescent; lvs. linear, 1-veined, the lower lanceolate; heads on slender stalks, in a long virgate rac.; scales oblong, obtuse. Dry. Ga. Fl. 2—3f.

15 **L. pychnostáchia** Mx. Hirsute; lvs. rigid, lanceolate, the upper narrow-linear; spike dense, thick, of numerous cylindric heads; scales appressed, with acute, scarious, colored and spreading tips. Prairies. Ill. to Tex. 3—5f. Spike 10—20′.

16 **L. Chapmánii** T. & G. Tomentous; lvs. linear, obtusish, the upper very short; hds. cylindric, 3-flowered, densely spiked; scales acum.; fr. hairy. Fla. 1—2f.

17 **L. pauciflòra** Ph. St. pubescent, recurved; lvs. linear, short, the lowest lance-linear; rac. recurved, with the hds. all turned to the upper side; hds. 4–5-flowered; scales lance-oblong, acute. Dry sand-hills, S. 1—3f. (L. secunda Ell.)

8. **KÚHNIA,** L. Heads 10–25-flowered, ☿. Scales lanceolate, loosely imbricated. Recept. naked. Cor. slender, 5-toothed. Pap. in a single series, plumous. Fr. cylindrical, striate, pubescent. ♃ With alternate, resinous-dotted lvs., and corymbed heads of pale yellow florets. September.

K. eupatoroìdes L. St. somewhat viscid-pubescent; lvs. lance-ovate to lance-lin., resinous-dotted, petiolate, toothed or entire. Dry soils, N. J., W. and S.

9. **BRICKÉLLIA,** Ell. Heads many-flowered, ☿. Scales imbricated, lanceolate or linear, striate. Receptacle naked, flat. Cor. tube slightly expanded above, 5-toothed. Branches of the style clavate. Fr. 10-striate, contracted above. Pap. setaceous, in one series. ♃ With opposite, 3-veined leaves and large heads of purple florets in corymbs.

B. cordifòlia Ell. Pubescent; lvs. triangular, truncate or cordate, crenate, petiolate; hds. 30–40-flowered, scales obtuse; pap. purple. Ga. Fla. 2—4f. August.

10. **EUPATÒRIUM,** Tourn. BONESET. Fls. all tubular, ☿. Invol. imbricate, oblong. Style much exserted, deeply cleft. Anth. included. Recept. naked, flat. Pap. capillary, simple, scabrous. Cyp. 5-angled. ♃ Generally with opposite, simple lvs. and corymbous hds. Fls. of the cyanic series—that is, white, blue, red, &c., never yellow. July—September.

§ Leaves mostly alternate, pinnately dissected. Heads paniculate, very ∞......Nos. 1, 2
§ Leaves mostly opposite or verticillate,—*c* pinnately dissected. Hds. corymbed...No. 3
—*c* undivided. Heads corymbed..(*)
  * Scales imbricated in several rows, the outer gradually shorter...(*a*)
    a Flowers bluish. Leaves opposite. Scales strongly striate.....................No. 4
    a Flowers purplish. Lvs. whorled. Scales streaked and flesh-colored..Nos. 5—7
    a Flowers white, 5 only in each head. Lvs. subsessile. (exc. No. 18)..(*b*)
      b Leaves acute at base. Scales with acute white points....................Nos. 8—10
      b Leaves acute at base. Scales obtuse, short, downy.............Nos. 11—14
      b Leaves obtuse, roundish or truncate at the base.................Nos. 15—18
    a Flowers white, 7—15 in each head. Leaves various.................Nos. 19—22
  * Scales all of equal length, in about 1 row. Leaves petiolate...............Nos. 23—25

1 **E. fœniculàceum** Willd. Very branching; lvs. all alternate, compoundly pinnate, in linear-filiform segments, the upper setaceous, simple; heads 3–5-flowered. Fields, Pa. (rare) to Fla. 3—10f. Flowers yellowish-white, 1—2″ long.

2 **E. coronopifòlium** Willd. Much branched, pubescent; leaves mostly alternate (the lower opp.), twice pinnatifid, with lance-linear lobes and segm., the upper linear, simple; hds. 5-flowered, scales 10. Dry soils, S. 3—5f. Flowers white, 2″.

3 **E. pinnatìfidum** Ell. Pubescent; lvs. laciniate-pinnatifid, segm. linear, toothed or entire, the lower whorled in 4's, middle opp., upper altern.; corymb fastigiate; hds. small, ∞, 5–9-flowered; scales oblong, mucronate. Pine woods, S. 3—4f.

4 **E. ivæfòlium** L. Lvs. opposite, lanceolate, tapering to each end, 3-veined; heads pedicellate, 15–20-flowered; scales 20, imbricated, erect, obtuse, with 3—5 distinct striæ. Woods, Miss. and Fla. 3—5f. Blue.

5 **E. purpùreum** L. Stem solid, purple at the joints; lvs. feather-veined, in whorls of 3's—5's, thin, ovate to lanceolate, coarsely serrate. Dry. 3—6f.

6 **E. fistulòsum** Barratt. *Trumpet-weed.* Stem hollow, striate, glabrous, glaucous-purple; lvs. lance-oblong, in 5's, 6's, finely serrate; corymb globous, with whorled rays. Thickets. 6—10f. Lvs. 8′. Corymbs 1f. (E. purpureum. β. T. & G.)

7 **E. maculàtum** L. Stem solid, marked with purple glands and lines; leaves 3-veined, ovate, in 3's—5's. Low grounds: common. 3—5f. (E. purpureum. β. Darl.)

8 **E. scábridum** Ell. ? (Chapm.) St. stout, tomentous; lvs. lance-ovate, acute, ser., 3-veined from base; scales lance-obl., cuspidate, edged, shorter than fls. Car. Fla. 2f.

9 **E. album** L. Rough-downy; lvs. lance-oblong, acutish; hds. oblong, 5-flowered; scales white-scarious at the point, longer than the fls. Sands, N. J. and S. 2f.

10 **E. leucólepis** T. & G. Nearly smooth; lvs. lance-linear, obtuse; heads 5-flwd.; scales white-scarious at the tip, as long as the fls. Sands, L. I. and S. 2—3f.

11 **E. hyssopifòlium** L. Lvs. linear-lanceolate, 1–3-veined, punctate, lower ones subserrate, upper ones entire; scales oval. Dry. Mass., W. and S. 2f. Hds. 3″.

12 **E. parviflòrum** Ell. Lvs. lanceolate, sessile, acutely serrate above, 3-veined; heads 2″, crowded; outer scales very short, inner linear. Damp. Va. to Fla. 2—3f.

13 **E. altíssimum** L. Tall, downy; lvs. lanceolate, few-toothed above, conspicuously 3-veined; scales 8—12, elliptical, 2½″; fls. 5″. Dry. Pa. to Car., and W. 3—7f.

14 **E. cuneifòlium** Willd. Downy; lvs. small, glaucous, obovate-oblong, 3-veined, apex *obtuse* and subserrate; scales oval, 2″; fls. 4″. Rich shades, S. Car. to Fla. 2f.

15 **E. teucrifòlium** Willd. Rough-downy; leaves sessile, ovate, veiny, the lower doubly serr.; scales elliptical, faintly striate, rather acute. Damp. Mass. to La. 2—3f.

16 **E. sessilifòlium** L. Smooth; leaves half-clasping, lance-ovate, serrate; inner scales oblong-obovate, obtuse. Rocky woods, Mass. to Ind., and S. 2—4f. Lvs. 3—5′.

17 **E. rotundifòlium** Willd. *Hoarhound.* Downy; lvs. roundish ovate, subcordate, 3-veined, sessile, coarsely toothed; inner scales acuminate, as long as the fls. Dry fields, N. J. and S. A compact, bushy plant. 3f.

18 **E. mikanioìdes** Chapm. St. creeping at base, ascending; lvs. deltoid, truncate at base, petioles subconnate; scales lanceolate, acute. Isl. St. Vincent, Fla. 1—2f.

19 **E. pubéscens** Muhl. Hairy; lvs. distinct, sessile, ovate, acute, blunt-toothed; hds. about 8-flwd.; scales lanceolate, acute, short. Dry. N. H. to N. J., and Ky. 3—4f.

20 **E. resinòsum** Torr. Viscid-resinous; leaves distinct, closely sessile, lin.-lanceolate, long-pointed; hds. 10–15-flwd.; scales obtuse, white-downy. Barrens, N. J. 2-3f.

21 **E. perfoliàtum** L. *Thoroughwort. Boneset.* Hairy; lvs. lanceolate, each pair united at base around the stem; heads about 12-flowered, in a large, dense corymb; scales lance-oblong, acute. Low grounds: common. 3—4f. A powerful tonic.

22 **E. seròtinum** Mx. Soft-puberulent; lvs. petiolate, lance-ovate, sharp-serrate, 3-veined; hds. 12–15-flwd.; scales 9—11, similar, very downy, obtuse. Md., S. and W. 5f.

23 **E. ageratoìdes** L. Smooth; lvs. long-petiolate, ovate, acuminate, sharp-serr., 3-veined; hds. 10–20-flwd., in a compound corymb; scales oblong, obtuse. Woods. 3f.

24 **E. aromáticum** L. Rough-downy; lvs. petiolate, lance-ovate, acute, 3-veined, blunt-serr.; hds. 10–15-flwd., in small corymbs; scales lance-linear. Low woods. 2f.

25 **E. incarnàtum** Walt. Diffusely branched; leaves long-petioled, deltoid-ovate, pointed, coarsely crenate-dentate; hds. on slender ped., 15–20-flwd.; scales lin.-subulate, 3-striate; lobes of the corolla pale purple. Damp soils, N. Car. to Fla. 3f.

11. MIKÀNIA, Willd. CLIMBING BONESET. Fls. all tubular, ☿. Involucre 4-leaved, 4-flowered. Receptacle and flowers as in Eupatorium. ♃ Climbing and twining. Leaves opposite.

M. scándens Willd. Smooth; lvs. cordate, repand-toothed, acuminate, the lobes divaricate; hds. in pedunculate, axillary corymbs. Thickets, Ms. to Ga. Not common. Clusters on the short, lateral branches, of white or pink-colored flowers. Aug. Sept.

12. CONOCLÍNIUM, DC. Heads many-flowered. Receptacle conical. Character otherwise as in Eupatorium. ♃ ♄ Leaves opposite, petiolate, serrate. Flowers sky-blue, in crowded corymbs.

C. cœlestìnum DC. Much branched; lvs. deltoid-ovate, truncate or subcordate, crenate-serrate, petiolate; scales linear. ♃ Copses, Pa., S. and W. 1—2f. Aug. Sept.

13. TUSSILÀGO, Tourn. COLT'S-FOOT. Head radiate, many-flowered. Flowers of the ray ♀, those of the disk ♂. Invol. simple. Recep. naked. Pappus capillary. ♃ Lvs. radical. Fls. yellow, with very narrow rays.

T. fárfara L.—Cold, clayey banks, N. and M. Scape 5′, appearing with its single head of yellow flowers in March and April, before the large angular leaves.

14. NARDÓSMIA, Cass. Heads radiate, ∞-flowered, somewhat ♀ ♂. Fls. of the ray ♀, of the disk ☿, but abortive in the sterile plant. Invol. simple. Recep. flat, naked. Pappus capillary. ♃ Leaves radical. Fls. cyanic. The ray flowers of the sterile heads are in a single row; of the fertile in several rows, but very narrow.

N. palmàta Hook. Scape with a thryse or corymb; lvs. roundish-cordate, 5-7-lobed, woolly beneath, coarsely dentate. Swamps, N. Eng. and W. Rare. May.

15. ADENOCAÙLON, Hook. Fls. few, all tubular, of the margin ♀, of the disk ♂. Scales equal, in one series. Recep. naked. Cyp. clavate, exserted, bearing stalked glands above. Pap. 0. ♃ Nearly acaulescent, with alternate leaves, and small, paniculate heads, also gland-bearing.

A. bìcolor Hook. Lvs. deltoid, cordate, angular-toothed, decurrent on the petioles, white-downy beneath. Shores of Lake Superior, and W. (Common in Oregon.) 2f.

16. AGATHÆ̀A, Cass. Heads as in Erigeron, but the scales are 1-veined, keeled or channelled, and the cypselæ rough-haired. ① ♄ S. Afr. Leaves opposite. Disk flowers yellow, rays blue. (Cineraria, L.)

A. AMELLOÌDES. Lvs. ovate or oval, petiolate, entire, scabrous. Not hardy. A beautiful shrub, often cultivated in the greenhouse. 1—2f. Heads solitary.

17. SERICOCÁRPUS, Nees. WHITE-TIPPED ASTER. Ray fls. 4—6, ♀: disk fls. 6—10, ☿. Invol. oblong, imbricated. Scales appressed, white, with green, spreading tips. Recep. alveolate. Cyp. obconic, very silky. Pap. simple. ♃ With alternate lvs. and close corymbs. Rays white.

1 **S. solidagíneus** Nees. Smooth; lvs. linear-oblanceolate, obtuse, entire, sessile; heads subsessile; scales obtuse; pap. white. Woods: com. 2f. Rays long. Jl. Aug.

2 **S. conyzoìdes** Nees. Some pubescent; lvs. lance-oval, acute, serrate, the lower narrowed into a petiole; rays short; pappus rusty. Woods, Ms. to Fla. 1-2f. Jl. Aug.

3 **S. tortifòlius** Nees. Grayish pubescent; lvs. short, oblong-obovate, sess., twisted to a vertical position, both sides alike; pappus white. Woods, Va. to Fla. 2f. Sept.

18. ASTER, L. Invol. oblong, imbricate. Scales loose, often with green tips, the outer spreading. Disk fls. tubular, ☿, ray fls. ♀, in one row, ligulate, 3-toothed at apex, finally revolute. Recep. flat, alveolate. Pap. simple, capillary. Cypsela compressed. ♃ Very abundant in the U. S., flowering in late summer and autumn. Lvs. alternate, diminishing gradually upward. Disk-flowers yellow, changing to purple; ray-flowers blue, purple, or white, never yellow. Figs. 146, 388.

A Scales of the involucre tipped with green or wholly green...(§ 1, 2, 3)
B Scales destitute of green tips, white or scarious. Lvs. never cordate...(§ 4-*p*)
§ 1. BIÒTIA. Heads corymbous, large. Rays 6—15, white. Lvs. cordate....Nos. 1, 2
§ 2. CALLIÁSTRUM. Heads corymbous or few, large. Rays 12—30, violet-blue. Pap. bristles unequally thickened. Lvs. rigid, not cordate....(*a*)
a Lvs. ovate to lanceolate, serrate more or less. Fr. smoothish.....Nos. 3—5
a Leaves lance-linear to linear,—*b* entire, merely acute...............Nos. 6. 7
—*b* bristly-fringed, pungent.........Nos. 8, 9
§ 3. ASTÈRIA. Hds. panicled or racemed, rarely few. Pap. equal, soft...(*c*)
c Leaves petiolate, the lower cordate,—*d* evidently serrate..............Nos. 10, 11
—*d* entire or obscurely serrate...Nos. 12—15
c Leaves all sessile, entire, silky-canescent both sides. Pap. tawny....Nos. 16, 17
c Lvs. not silky,—*d* clasping with a cordate or auriculate base...(*f*)
—*d* clasping with a broad base not cord. or auric...(*h*)
—*d* sessile with a narrow base, not clasping...(*m*)
f Lvs. very small (1″—3″), entire. Scales with spreading tips..........Nos. 18, 19
f Leaves ordinary (1′—6′).—*e* Scales with abrupt, appressed tips........Nos. 20, 21
—*e* Scales loosely spreading. Lvs. entire....Nos. 22—25
—*e* Scales very loose. Lvs. long, serrate....Nos. 26, 27
h Scales of the involucre closely imbricated (obtuse, No. 20), acute....Nos. 28—31
h Scales loose, or spreading, or recurved.—*k* Pappus bright-colored...Nos. 32—34
—*k* Pappus tawny-brown.....Nos. 35, 36
m Scales squarrous-spreading at the tips.—*o* Hds. large (6″-1′), purple..Nos. 37, 38
—*o* Hds. small (2-4″), whitish..Nos. 39-41
m Scales loosely divergent, straight. Heads medium size, rays pale....... No. 42
m Scales erect, straight, in 1 row. Heads 2—3, or solitary, rays white.....No. 48
m Scales closely imbricated.—*n* Hds. medium (3-6″), purp. or pale...Nos. 43, 44, 31
—*n* Heads small (2—3″), white or pale.....Nos. 45—47
§ 4. SCARIÒSI.—*p* Lvs. lanceolate, broadly or narrowly. Scales obtusish....Nos. 49—51
—*p* Lvs. subulate or lin. Scales very acute.—*s* Hds. large, few..Nos. 52, 53
—*s* Hds. small, many...54—56

1 **A. corymbòsus** Ait. Nearly smooth; lvs. thin, ovate-acuminate, serrate, the petioles wingless; rays 6—9. Dry woods, N., M. 1—2f. Heads oblong, 4″. Lvs. large.

2 **A. macrophýllus** Willd. Rough-pubescent; leaves thickish, ovate, serrate with close teeth, petioles some winged; rays 8-15. Woods, N. 1-2f. Lvs. very large. Hds. 6″.

3 **A. mirábilis** T. & G. Lvs. ovate, serrate, the lowest petiolate, the ramial roundish; invol. hemispherical, scales obtuse; rays about 20. S. Car. Very rare.

4 **A. ràdula** Ait. Lvs. lanceolate, acuminate, sessile, sharp-serrate, rough and rugous; invol. squarrous with the spreading scale-tips; rays 20. N. 1—3f.

5 **A. spectábilis** Ait. Lvs. lance-oblong. sessile, entire, the lower subserrate; invol. hemispherical, scales linear-spatulate, ciliate. Sands, Mass. to Fla. 1—2f.

6 **A. surculòsus** Mx. Root a creeping, knotted rhizome; lvs. lance-linear and linear; heads 1—5; scales linear-oblong, ciliate, inner obtuse. Wet. N. J. to Car. 1f.

β. ***grácilis.*** Heads 8—12, smaller; rays 12; scales but slightly spreading.

7 **A. paludòsus** L. Slender, glabrous; lvs. long, linear; hds. 1—6; scales lance-linear; rays 30, longer than the (6″) invol. Swamps, S. 2—3f. Heads very large.

8 **A. spinulòsus** Chapm. Bristly-hairy, rigid; lvs. narrowly linear, pungent, bristle-fringed; heads few, spicate; scales spine-pointed; rays 13, blue. Fla. 1f.

9 **A. eryngifòlius** T. & G. Hairy, rigid; lvs. lance-linear, pungent, fringed with spiny teeth; heads very large, 1—4, loosely racemed; scales green, rigid, lanceolate, long-pointed; rays many, white. Fla. 1—2f. (Prinopsis Chapmanii, C–B.)

10 **A. cordifòlius** L. Stem paniculate; leaves sharply serrate, acuminate; petioles winged; scales appressed, with short green tips. Woods and glades, N. and W.: com. 1—3f. Heads numerous, rather small, blue varying to white, in a large panicle.

11 **A. sagittifòlius** Willd. Branches racemed; lvs. lance-obl., some arrow-shaped; petioles winged; scales loose, lin.-subulate. Low woods, N. and W. 2-4f. Wh.-blue.

12 **A. undulàtus** L. Racemous-paniculate, rough, grayish; lvs. ovate-oblong, undulate-crenate, the base, or the winged petioles, cordate-clasping, the upper acute, entire, sessile: scales appressed. Dry woods. 2f. Blue. (A. diversifolius Mx.)

β. ***aspérulus.*** Lowest petioles slender, not clasping; lvs. scarcely cordate. Com.

13 **A. azùreus** Lindl. Slender, rigid, rough; lvs. below on slender petioles, cordate-lanceolate, the others successively lanceolate, linear, and subulate, acute at each end; rac. paniculate, heads obconic; scales acute, appressed. Woods, prairies, W. 2f.

14 **A. Shórtii** Hook. Smoothish, subsimple; lvs. lance-ovate, deeply cordate, petiolate, long-pointed, entire, the upper sessile; rac. paniculate; scales green-tipped, shorter than the disk, Rocky banks, O. to Wis. and Ark. 3f.

15 **A. anómalus** Eng. Lvs. as in No. 13; scales with linear, spreading, leafy tips; hds. large; rays spreading, 15—18″, bright-blue. Rocks, Ill. Mo. (Mr. J. Wolf.) 2—4f.

16 **A. seríceus** Vent. Bushy; lvs. silvery-silky both sides, lance-oblong, sessile; hds. large, terminal on the short, leafy branches; scales spreading at tip; fr. glabrous; rays 15—25, violet blue. Banks, Mich. (H. Mapes) to Iowa, and S. 1—2f.

17 **A. cóncolor** L. Subsimple; lvs. grayish-silky, lance-oblong, the upper cusp-pointed; heads in a terminal, virgate raceme; scales lanceolate, appressed; fruit silky; rays purple. Pine-barrens, N. J. to Fla. 2—3f. Aspect of Liatris.

18 **A. squarròsus** Walt. Slender, with simple, 1-flowered branches; leaves very small, triangular, heart-clasping, reflexed-squarrous; scales with spreading green tips; fr. pubescent. Dry soils, S. 2—3f. Rays 20, blue.

19 **A. adnàtus** N. Slender, rough; lvs. oblong to lanceolate, erect, adhering to the stem by the midvein, the summit only free. Sands, Fla. to La. 2—3f.

20 **A. turbinnéllus** Lindl. Smooth, subcorymbed; lvs. lance., tapering both ways; hds. club-top-shaped (6″); sc. tips short, blunt. Ill. Mo. to La. Blue. Pap. brown.

21 **A. lævis** L. Very smooth; branchlets 1-flwd.; lvs. oblong, entire, shining, lowest lanceolate, subserrate, upper auriculate; scales with a broad, acute, appressed tip; heads large, rich blue, showy. Low woods. 2—3f.

β. ***lævigàtus.*** Not glaucous; leaves linear-lanceolate; scales linear.

γ. ***cyàneus.*** Plant glaucous; leaves thickened, very entire. Beautiful Asters.

22 **A. patens** L. Pubescent; rac. paniculate; lvs. ovate-oblong, cordate-clasping, ciliate at edge; heads large, terminal on the leafy branchlets; scales lax, green-tipped: rays 20, violet-blue. Dry soils, Mass. to Ga. 2—3f.

β. ***phlogifòlius.*** Leaves lance-ovate, auriculate-clasping, very acute.

23 **A. amethystìnus** N. Hoary-puberulent; rac. paniculate; lvs. lin.-oblong, acute. some auricled at the clasping base; heads broad-bell-shaped (3″); scales erect, with only the green tips spreading. Damp, Mass. to Ill. (J. Wolf.) 2—3f.

24 **A. Novæ-Angliæ** L. Corymbous-paniculate, pubescent; lvs. lanceolate and lance-linear, auriculate-clasping; scales equal, lax, glandular-viscid, green their whole length; rays 70+, deep purple. Damp. 4—6f.—Varies with the rays rose-purple, or rarely, white. Fine in cultivation.

25 **A. Caroliniànus** Walt. Rough-downy; branches divaricate; lvs. lance-ovate, entire, clasping with small auriculate lobes; heads very large, scattered; scales with spreading green tips; rays rose-purple. Damp, S. 6—13f.

26 **A. puníceus** L. Hispid, panicled; lvs. lance-oblong, auriculate-clasping, ap-

pressed-serrate; scales 2-rowed, long, revolute; heads large, showy, with 30—60 narrow, pale-purple rays. Swamps, Can. to Car., and W. 4—6f. Stem often red.

β. ***vimineus.*** Tall, slender, smoothish; heads few, very large; leaves narrow.

γ. ***glaber.*** Low (2f), subsimple, smoothish; leaves narrow, erect, entire; scales loose, not recurved; rays large, about 20, white? Ill. (J. Wolf.)

δ. ***firmus.*** Low (2—3f), scabrous, stout; leaves thick, subentire; heads many.

ε. ***cándidus***—the common form, with white rays. N. Y. (Hankenson.)

27 **A. prenanthoìdes** Muhl. Hairy or downy, corymbous-paniculate; lvs. lance-oval, pointed, serrate, the long petiole winged and auriculate-clasping: scales spatulate, the green tips spreading. Wet banks, N. Y. to Va., and W. 2—3f.

28 **A. concínnus** Willd. Pubescent, subsimple; lvs. lanceolate and lance-linear, remotely serrate, narrowed to the clasping base, the upper entire; scales appressed-imbricate; heads medium, rays blue. Woods, &c. 2—3f.

29 **A. gracilléntus** T. & G. Very smooth, slender, simply panicled: leaves long-linear, the lower toothed, upper clasping, erect; scales short; rays blue. S. Rare.

30 **A. mutábilis** Ait.? Stem smooth, paniculate-branched from base, dense-flwd.; leaves linear-lanceolate, serrulate, clasping, thickish, upper lance-oblong, entire; heads medium; scales lanceolate, loose, much shorter than the disk; rays pale? Wet. Ill. (J. Wolf.) 2—3f.—Varies with leaves serrate, heads loose, &c.

31 **A. cárneus** Nees. Smoothish; branches leafy, ascending, racemed with 1-headed branchlets; lvs. uniform, linear-lanceolate, pointed, only the upper clasping; scales acute, shorter than the disk. Moist, E. and W. Heads larger than in No. 30, purple to rose, showy. Stem often red, 2—3f high.

32 **A. virgàtus** Ell. Smooth, virgate branches racemed; leaves linear-lanceolate, ciliate-serrulate, half-clasping, graded above into numerous subulate bracts and spreading, pointed scales; fruit glabrous. Ga. to La. 3—4f.

33 **A. Novi-Bélgii** L. St. smoothish, branches pubescent; lvs. subclasping, lance-obl. to linear, pointed, the lower subserrate; heads large, racemed or subcorymbed; scales subequal, loose, equalling the disk. N. Y. to Ill. 2-4f. Blue. (A. æstivus Ait.)

β. ***lætiflorus.*** Branches slender, corymbed at end; lvs. very narrow. W. Showy.

34 **A. longifòlius** Lam. Stem glabrous, paniculate-spreading; lvs. lance-linear to linear, long, pointed, subclasping, nearly or quite entire, upper subulate; heads large; scales linear-subulate, the outer spreading. E. and W. 2—6f. Blue.

β. ***præáltus.*** Tall, strict, with thyrsoid panicles, medium heads: lvs. serrulate.

35 **A. Ellióttii** T. & G. Stout, smooth, corymbous-branched; lvs. ample, lanceolate, subclasping, subserrate; ped. naked; scales attenuate. Swamps, S. 2—4f. Purple.

36 **A. oblongifòlius** N. Hairy, bushy; branches spreading; leaves obl.-lanceolate, acute, entire, clasping, graded above into subulate bracts and subequal spreading scales. Va. (Harper's Ferry) to Iowa and Mo. Rays purple. 1—2f.

37 **A. grandiflòrus** L. Rough, bristly-hairy; branches some corymbed, 1-flowered; lvs. small, linear-oblong, obtuse; hds. very large, blue-purple; scales obtuse. S. 2f.

38 **A. Curtísii** T. & G. Smooth, racemous; lvs. thin, sessile, lanceolate, acuminate, subentire; scales with green spreading tips; heads large, showy. Mts. N. Car.

39 **A. dumòsus** L. Rac. paniculate; *lvs. linear* to oblong, sessile, lowest subserrate; invol. obtuse at base, closely imbricated; scales obtuse; heads small, rays 20+, purplish-white. Dry woods, &c.: common. 1—2f. Lvs. very numerous, 3′—3″.

β. ***coridifòlius,*** is a starved, attenuate form, very slender every way.

40 **A. Tradescánti** L. Smoothish, slender, much branched; lvs. lance-linear, long, remotely serrulate, teeth sharp, upper leaves entire, all sessile; heads many, subsecund; scales close; rays small, pale. Fields, copses. 2—4f. Leaves 5′—5″.

β. ***frágilis.*** Leaves nearly linear, minutely serrulate; heads scattered.

41 **A. miser** L. Hairy or downy, very leafy; branches spreading, racemous; lvs. all lanceolate, tapering both ways, sessile, sharply serrate in the middle, the ramial smaller, entire; scales acute, close; rays whitish, short. Old fields. 6′—30′.—Varies greatly. Lvs. 5′—1′, broad or narrow. Hds. dense or scattered. Rays 15+, 2—3″.

42 **A. simplex** Willd. Loosely corymbous-paniculate, smoothish; lvs. lanceolate, acuminate, the lower serrate; heads scattered; scales loosely imbricated, linear-subulate. Low grounds: common. 3—6f. Heads twice larger than No. 41, blue to white.

β. ***divérgens.*** Diffusely branched, loosely racemous; branches hairy in lines.

43 **A. tenuifòlius** L. Paniculate-branching, with 1-flowered branchlets; lvs. linear-lanceolate to lance-linear, slender-pointed, sessile, remotely serrulate, upper entire; scales linear-subulate, equalling the disk. Moist fields. 2—6f.

β. ***bellidiflòrus.*** Leaves scabrous, slightly clasping; scales loosely imbricated.

γ. ***distichus.*** Leaves and strict ascending branches in 2 rows! Ill. (Mr. J. Wolf.)

44 **A. subásper** Lindl.? Pubescent above; racemous-branched, branches short, dense-flwd.; lvs. lance-acuminate, appressed-serrate, rough, attenuate to a petiole. upper reduced, entire, sessile; invol. closely imbricated; rays purp. Dry. Ill. 2f. (Wolf.)

45 **A. ericoìdes** L. Smoothish; branches virgate, branchlets secund, 1-headed; lvs. lance-lin. to subulate; hds. small; sc. as long as disk, with subulate-mucronate spreading tips. Rocky fields. 1–3f. Lvs. 4′–4″, attenuate-mucronate. Rays white or purplish.

46 **A. racemòsus** Ell. Rough-downy; branches slender, erect; hds. very small (2″), spicate-racemous, crowded above; lvs. linear, sessile, rigid, 3′—3″. Coast, S. Car. 2f.

47 **A. multiflòrus** L. Grayish-downy, diffusely branched; lvs. linear, entire, sess., obtuse-mucronate; hds. small; sc. with obtusish spreading tips. Dry fields. 1f. Very bushy, with crowded racemes. Rays about 12, pale, 2—3″ long.

48 **A. graminifòlius** Ph. Slender, with filiform erect branches, 6—12′; lvs. linear, crowded below; ped. slender, leafless, 1-flwd.; sc. subulate-linear; rays about 20, white or rose. Rocks, Vt. N. H.: rare. (Willoughby Lake, Vt., Bradford, Vt., White Mts.)

49 **A. acuminàtus** Mx. St. simple, flexuous, angular, branching into a corymbous panicle above; lvs. broad-lanceolate, narrowed and entire at the base, serrate and acuminate; scales lax, linear. Wooded hills, N. 1f. Rays 12+, long, white.

50 **A. nemoràlis** Ait. Branches corymbed or 0; ped. 1-flwd., nearly naked, filiform; lvs. narrowly lanceolate, acute at each end, veinless, subentire; sc. very acute, loose, shorter than the disk; rays long, about 20. Wet woods. 1f. White-purple.

51 **A. ptarmicoìdes** T. & G. St. corymbous-fastigiate above; lvs. lin.-lanceolate, acute, rough-margined, entire, lower ones dentate, attenuated into a short petiole; rays short, snow-white. Rocky shores, Vt. to Mo. Rare. Heads rather large.

52 **A. flexuòsus** N. Smooth, slender, flexuous; branches leafy, 1-flwd.; lvs. fleshy, long-lance-linear to subulate; hds. large; rays short, many, purple. Marshes. 1f.

53 **A. Chapmánii** T. & G. Smooth, slender, strict; branches filiform, 1-flwd.; lvs. linear-subulate; rays longer than invol., 20—30, purp.; cyps. glabrous. Swamps, Fla.

54 **A. linifòlius** L. *Sea Aster.* ① Smooth, much branched, paniculate; lvs. lance-linear to subulate; scales in 3 rows; rays minute, scarcely exserted. Marshes. 1f.

55 **A. subulàtus** Mx. ① Smooth, slender, much branched, corymbed; lvs. linear-subulate; rays many, narrow, in 1 row, longer than the disk, blue. Wet. S. 1—3f.

β. ***éxilis.*** Taller (2—4f), less branched; heads few, rays pale purple. Ga.

19. DIPLOPÁPPUS, Cass. DOUBLE-BRISTLED ASTER. Ray-flowers about 12, ♀. Disk-flowers ∞, ☿. Invol. imbricate. Scales narrow, destitute of green tips. Recep. flat, subalveolate. Pap. double, the exterior very short (about ½″ long), interior copious, capillary. Fruit compressed. ♃ Lvs. entire, alternate. Heads corymbous or few, rays cyanic, disk yellow.

§ Rays violet. Achenia silky. Bristles of the inner pappus alike. Sept. Oct.....No. 1
§ Rays whitish. Some of the longer bristles clavellate.—Ach. smoothish. Aug..Nos. 2, 3
—Ach. villous. Sept. Oct...No. 4

1 **D. linariifòlius** Hook. St. clustered, leafy; branches 1-flwd., fastigiate; lvs. lin., entire, 1-veined, obtuse, rigid, rough. Dry places. 1f. Heads rather large, showy.

2 **D. umbellàtus** Hook. Smooth, simple, strict, with ∞ heads in a level corymb;

lvs. long (4-6′), lanceolate, acuminate; sc. obtuse; fr. pubes. in lines. Low grounds. 2—4f. Stems purplish. Rays about 12, 3—4″ long. Handsome.

β. ***amygdalinus.*** St. roughish above; lvs. ovate-lanceolate; sc. rather loose. 2-3f.

3 **D. cornifòlius** Less. Rough above, some hairy in lines; hds. few, corym.-paniculate; lvs. elliptical, thin, long-pointed both ways, entire; scales shorter than the disk, obtuse; cypsela glabrous. Woods, Can. to Car. 1—2f. Rays about 10, white.

4 **D. obovàtus** (Ell.) Cinereous-pubescent: heads corymbed; lvs. obovate-oblong, acute; sc. lin.-subulate, rusty yellow; fr. villous; rays white. Damp shades, S. 2—3f.

20. **ERÍGERON,** L. FLEABANE. WHITE-WEED. Heads subhemispherical. Ray-flowers ♀ (40—200), narrow, linear. Fls. of the disk ☿, ∞. Recep. flat, naked. Scales of the involucre nearly in one row and equal. Pap. generally simple. Herbs with alternate lvs., rays cyanic, disk yellow.

§ Rays minute, shorter than the cylindrical involucre, white. Pappus simple....1, 2, 10.
§ Rays long, showy, 30—40. Pappus simple. Lvs. all radical. Hds. corymbous..No. 3
§ Rays long, showy, 50—200.—*a* Pappus simple. Leaves clasping. Corymbous...Nos. 4—6
—*a* Pappus double. Leaves sessile. Corymbous....Nos. 7—9

1 **E. Canadénse** L. Erect; invol. oblong; rays 40—50, crowded, minute; pap. simple; stem hairy, paniculate; leaves lanceolate. ① A common weed. 6′—6f. Jl.—Oct.

2 **E. divaricàtum** Mx. Decumbent and diffusely branched, hirsute; lvs. linear and subulate; hds. very small, loosely corymbous. ② Dry soil, W. and S-W. 6′—2f. Purp.

3 **E. nudicaùle** Mx. Glabrous; lvs. obovate or spatulate, radical, rosulate, entire; hds. few; rays narrow, white. ♃ Pine-barrens, S. Scape bracted, slender. 18′. Jn. Jl.

4 **E. bellidifòlium** Muhl. *Robins' Plantain.* Hirsute; radical lvs. obovate, obtuse, subserrate; stem lvs. remote, mostly entire, clasping; hds. 3—7; rays 50—60, purple, linear-spatulate. ♃ Dry soils: common. 1—2f. May, June. Handsome.

5 **E. Philadélphicum** L. Pubescent or hirsute; lvs. thin, lower spatulate, crenate-dentate, upper clasping, sometimes cordate-auriculate; heads few, on long, slender ped.; rays 150-200, filiform, reddish. ♃ Damp: com. 2f. St. lvs. various. Jn.-Aug.

6 **E. quercifòlium** Lam. Pubescent; root lvs. oblong-obovate, lyrate-pinnatifid, or deeply sinuate-toothed, the cauline sharply serrate, clasping; heads ∞, small, with innumerable filiform flesh-colored rays. ♃ Low grounds. S. May.

7 **E. ánnuum** Pers. *Common Fleabane. White-weed.* Hirsute, branching; leaves coarsely serrate, ovate to lanceolate, the lower on winged stalks; rays very numerous, narrow, white. ① ② Fields: common. 2—4f. June—Aug.

8 **E. strigòsum** L. Rough, with short, appressed hairs, or nearly smooth; lvs. lanceolate, tapering to each end, entire, or with a few large teeth in the middle, lower ones 3-veined and petiolate; pan. corymbous, white. ② Grass lands: com. 2f. Jn.—Oct.

9 **E. glabéllum** Nutt. Lvs. smooth, entire, spatulate, long-tapering at base, upper lanceolate and lance-linear, sessile, acuminate; heads 4—6, pubescent; rays very numerous, pale blue. Wis. to Dak. 12′—18′. July, Aug.

10 **E. acre** L. Erect, 1f; lvs. entire, oblong to lanceolate; heads few or many, hemispherical, with bluish-purple rays as long as the pappus. Lake Superior (Porter).

21. **CALLÍSTEPHUS,** Cass. CHINÁ ASTER. Ray flowers ♀, ∞, disk-flowers ☿. Involucre hemispherical. Recep. subconvex. Pappus double, each in 1 series, outer series short, chaffy-setaceous, with the setæ united into a crown; inner series of long, filiform, scabrous, deciduous bristles.

C. CHINÉNSIS. Stem hispid; branches divergent, 1-flwd.; leaves ovate, coarsely dentate, petiolate, cauline ones sessile, cuneate at base. China? Cultivation has produced innumerable varieties, double and semi-double, of every color. Aug., Sept. ①

22. **BELLIS,** L. GARDEN DAISY. Rays ∞, ♀. Disk ☿. Involucel

hemispherical, of equal scales. Recep. subalveolate, conical. Pap. none. ① ♃ Heads solitary.

1 **B. integrifòlia** Mx. Annual, diffusely branched; lvs. entire, spatulate-obovate to lance-obl.; sc. with scarious margins; rays violet-purp. Ky. to Tex. 6–12′. Mar.–May.
2 **B.** PERÉNNIS. Perennial, acaulescent; root creeping; scape naked, single-flwd.; lvs. obovate, crenate. Europe. 3—4′. Fls. white, double, quilled, &c. June—Aug.

23. **DÀHLIA,** L. Rays ♀. Disk ☿. Invol. double, the outer series of many distinct scales, the inner of 8 scales united at base. Recep. chaffy. Pappus none. ♃ Splendid Mexican herbs. Leaves opposite, pinnate.

D. VARIÁBILIS. Lfts. ovate, acuminate, coarsely serrate, 3—7 in number; stems stout, widely branched; heads solitary, very large; root tuberous. Colors exceedingly variable and splendid. Heads about 3′ diameter; but a variety (the *bouquet Dahlia*) has the heads from 1½ to 2′ broad.

24. **BOLTÒNIA,** L'Her. Ray-flowers ♀, in a single series, those of the disk tubular, ☿. Scales in 2 series, appressed, with membranous margins. Recep. convex, punctate. Cyp. flat, 2- or 3-winged. Pap. of minute setæ, 2 (to 4) of them usually lengthened into awns. ♃ Glabrous, loosely branching. Leaves sessile. Rays white. Aug.—Oct.

1 **B. asteroìdes** L'Her. Lvs. lanceolate, all entire; heads corymbed; fruit broadly-oval with a few minute setæ,—no awns. Swamps, Pa. to Ga. 1—3f. Rays 13—20.
2 **B. glastifòlia** L'Her. Lvs. linear-lanceolate, the lowest serrate; heads in a loose paniculate corymb; fruit obovate, with 2 long awns. Prairies, W. & S. 3—7f. Rays 30.
3 **B. decúrrens.** Lvs. lance-oblong, the broad base decurrent on the green, winged stem; heads corymbed, globular in fruit; fruit obovate, with 2 awns and several minute bristles; rays purple. Bottoms. Ill. (J. Wolf.) (B. glastifolia. β. ? T. & G.)
4 **B. diffùsa** Ell. Lvs. lance-linear to subulate, entire; hds. small, in a diffuse panicle; fruit obovate, with 2 short (half its own length) awns. Prairies, W. & S. 3—6f.

25. **BRACHYCHÆTA,** T. & G. FALSE GOLDENROD. Pap. a single row of scale-like bristles, shorter than the obconic cypsela. Otherwise as in Solidago. The golden yellow heads arranged in little clusters, forming 1 or more unilateral racemes.

B. cordàta T. & G.—Woods, E. Ky. (at Cumberland Gap) to Ga. along the mountains. 2–4f. Lvs. ovate, cordate, the lower petiolate, serrate. Hds. small (3″ long). Aug.–Oct.

26. **SOLIDÀGO,** L. GOLDENROD. Fls. of the ray about 5, ♀, remote; of the disk ☿. Invol. oblong, imbricate, with appressed scales. Recep. punctate, narrow. Pap. simple, capillary, scabrous. ♃ Very abundant in the U. S. Stem erect, branching near the top. Lvs. alternate. Hds. small, with 1—15 (very rarely 0) small rays. Fls. yellow (one species whitish), expanding in the autumnal months. Fig. 319.

§ Shrubs 1—3f. Leaves punctate, veinless, entire. Rays 1—3. CHRYSOMA.........No. 1
§ Herbs. Scales of involucre with spreading herbaceous tips. CHRYSÁSTRUM...Nos. 2—4
§ Herbs. Scales imbricated, erect, scarious, seldom herbaceous...(*a*)
  a Inflorescence chiefly axillary, in clusters or short racemes...(*b*)
  a Inflorescence terminal, virgate or paniculate...(*d*)
  a Inflorescence terminal, in a fastigiate corymb...(*s*)
    b Rays white or cream-white. Clusters approximate above...............No. 5

b Rays golden yellow.—*c* Cypsela glabrous. Scales acute..............Nos. 6, 7
—*c* Cypsela pubescent. Scales obtuse..........Nos. 8—10
d Clusters or racemes erect, not secund. Leaves feather-veined...(*e*)
d Clusters or racemes recurved and secund (one-sided)...(*g*)
e Heads large, with loose scales. Alpine plants....................Nos. 11—13
e Heads not large.—*f* Plants glabrous. Rays 4—7.....................Nos. 14—16
—*f* Plants soft-downy. Rays 9—12...................Nos. 17, 18
g Leaves evidently feather-veined, mostly serrate...(*m*)
g Leaves evidently 3-veined. Herbs inland, not maritime...(*h*)
g Leaves 3- or 1-veined, fleshy. Very smooth, salt-marsh herbs......Nos. 19, 20
g Leaves not veiny, thick, subentire. Herbs some downy, inland...Nos. 21—23
h Leaves entire or very nearly so..............................Nos. 24—26
h Leaves serrate.—*k* Stem smooth and glabrous...................Nos. 27—29
—*k* Stem roughish-pubescent...................Nos. 30, 31
m Heads discoid, rays none. Southern..........................Nos. 32, 33
m Heads radiate.—*n* St. hairy or downy. Lvs. rough or smooth..Nos. 34—37
—*n* St. glab. Lvs. glab. or not.—*o* Rays 1—5....Nos. 38—40
—*o* Rays 6—12..(*p*)
p Racemes distant, loosely if at all panicled...................Nos. 41, 42
p Racemes close, forming a compact panicle................Nos. 43—45
s Hds. large, rays fewer than the disk fls.—*x* St. and lanc. lvs. smooth..Nos. 46–49
—*x* Plant hairy. Lvs. oblong..Nos. 50, 51
s Hds. small, rays more numerous than the disk flowers. EUTHÀMIA..Nos. 52, 53

1 **S. pauciflosculòsa** Mx. Bushy, glabrous, glaucous and some viscid; lvs. lance-linear, entire, sessile; rac. erect, panicled; fls. 5—7, rays 1—3, large. Coast, S.

2 **S. discoìdea** (Ell.) Downy-canescent; hds. about 12-flwd., with no rays; rac. erect, in a long, narrow panicle; lvs. ovate to lanceolate, serrate. Ga. Fla., and W. 3f.

3 **S. squarròsa** Muhl. Pubescent; hds. very large, ∞-flwd., rays 9—12; panicle long, spike-like; lvs. smooth, broad-oval to elliptic, serrate. Hills, Can. to Ga. 2—5f.

4 **S. petiolàris** Ait. Pubescent, striate; hds. 20–25-flwd., rays 6—10; rac. long, compound; lvs. rough, small, oval to elliptic, the upper subpetiolate; scales subulate, the outer herbaceous, loose, spreading. Uplands, S. and W. 1—3f. (S. squarrulosa, C-B.)

5 **S. bícolor** L. Hairy, simple; leaves elliptical, the lower serrate; heads glomerate, virgate-panicled above; scales obtuse; rays about 8, *whitish*. Hills. 2f.

β. ***hirsùta.*** Rays yellow, as well as the disk flowers. Penn. (S. hirsuta N.)

6 **S. Búckleyi** T. & G. Villous-pubescent; leaves oblong, serrate, acute at each end; clusters shorter than the leaves; fls. 15—20, rays 4—6; scales glabrous, rather acute; fruit compressed, glabrous. Interior of Alabama. 2—3f. Leaves 3′. October.

7 **S. montícola** (T. & G.) Stem terete, slender, puberulent above; lvs. oblong-lanceolate, pointed, subserrate; rac. approx.; fls. 12—15; fr. glabrous. Mts. N. Car. (Curtis).

8 **S. latifòlia** Muhl. Stem flexuous, angular, downy above; lvs. broad-ovate or oval, acuminate both ways, deeply serrate; racemes axillary and terminal, dense or loose; cypsela silky-pubescent; flowers 9—12, rays 3—4. Woody vales. 2f.

β. ***pubens.*** Pubescent, becoming woolly above. Mts. N. Car. (M. A. Curtis).

9 **S. ambígua** Ait. Smooth or smoothish; st. tall, angled; lvs. long-lanceolate, acuminate, finely serrate, the upper reduced and shorter than the racemes; heads large; scales obtuse, oblong; fruit hairy. Mts. N. Car. 3f. Leaves 4—5′.

β. ***Curtísii*** (T. & G.) Rac. shorter than the lvs.; sc. lin.-oblong; fr. silky. N. Car.

10 **S. cæsia** L. Stem slender, recurved at top, terete, smooth, glaucous; lvs. lin.-lanceolate, pointed, the lower serrate; fls. 6—10, rays 3—5, oval; racemes axillary, usually short; fruit puberulent. Hilly woods. 2—4f. Very elegant, wreath-like.

11 **S. thyrsoìdea** Meyer. St. stout, simple, angular; lvs. ovate, acute, sharply and unequally toothed, the lower on long petioles; hds. large, in a narrow, downy raceme or panicle, rays 8–10; cyp. glabrous. Mt. woods, Me. to N-Y. 1-4f. Coarse and showy.

12 **S. Virgaùrea** L. β. ***alpina*** (Bw.) St. dwarf, furrowed, simple; lvs. oval, subserrate or entire, narrowed to a petiole, upper lanceolate; hds. few (1—9), large, rays 10—12; sc. acute, very thin. Tops of high mts. Me. to N. Y., shores of L. Sup. 3—6′.

γ. ***glomeràta.*** Taller; lvs. ovate-oblong, serrate; hds. very large. Mts. N. Car.

13 **S. hùmilis** Ph. Glabrous, simple; lvs. oblanceolate, crenate-serrate, acute, the lower obtuse, petiolate; rac. paniculate; hds. middle-size, about 12-flwd.; sc. obtuse. Mt. streams, N. H. and N. 6—12′—2f.—Varies with the branches pubescent above.

14 **S. virgàta** Mx. Tall, virgate, with a simple raceme at top; lvs. thickish, entire, oblanceolate, the lower subserrate, petiolate; hds. about 15-flwd., rays 6—7; fr. pubescent. Damp pine-barrens, N. J. to Fla. 3—5f. Rac. 6′—1f long, of small clusters.

15 **S. stricta** Ait. Strict, simple; lvs. lanceolate, lower serrate, very long-petiolate, upper entire; panicle slender; heads 10–12-flowered; scales obtuse; rays 5 or 6. Wet woods, N. 2f.

16 **S. speciòsa** N. Stout, simple; lvs. lanceolate, entire, thick, lower very broad, subserrate, petiolate; panicle thyrsoid; ped. pubescent; rays, 6—8, large. Thickets: not common. 3—6f. Very handsome.—Varies with the panicle slender or virgate.

17 **S. verna** Curtis. Hoary-pubescent; stem few-lvd., loosely paniculate; lvs. ovate to lance-ovate, the lower finely serrate; rays 10—12. Barrens, S. Fls. in May, June.

18 **S. pubèrula** N. Puberulent as if dusty, strict, simple; lvs. oblanceolate to lanceolate, the lower subserrate; pan. dense, compound; sc. linear-subulate; fls. 20—25, rays about 10, elongated. In woods. Stem purplish, 2—3f. Heads rather large.

19 **S. sempérvirens** L. Lvs. thick, lanceolate, entire, obscurely 3-veined; hds. paniculate, 25–30-flwd., rays 8—10; ped. scabrous-pubescent. Marshes. 3—6f. Handsome.

20 **S. angustifòlia** Ell. Lvs. thick, entire, erect, 1-veined, the lower lanceolate; pan. dense, virgate; hds. 15–20-flowered, rays 7; ped. glabrous. Swamps, S. 2—4f.

21 **S. pilòsa** Walt. Hirsute, tall, stout; lvs. lance-oblong to lance-ovate, remotely serrulate, rough; rays minute, 2—10, disk-fls. 5—6. Damp barrens, N. J. and S. 4–7f.

22 **S. odòra** Ait. St. terete, smoothish, slender; lvs. lin.-lanceolate, abrupt at base, acute, pellucid-punctate; rays 2—4, disk-fls. 3—4. Dry hills and woods. 2—3f. The plant is yellowish-green, fragrant, and yields by distillation a fragrant oil.

β. ***retrórsa.*** Lvs. linear to subulate, acute, often twisted; rays 1—3. Ga.

23 **S. tortifòlia** Ell. St. rough-pubescent; lvs. many, linear, small, subentire, not punctate, often twisted at base; sc. obtuse; rays 3–5, disk-fls. 3–5. Dry fields, S. 2–3f.

24 **S. nemoràlis** Ait. Dusty-subtomentous; lvs. obscurely 3-veined, roughish, acute, attenuate at base; hds. small; fls. 10—15, rays 5—6, conspicuous. Dry fields, roadsides. 1–2f.—Varies with stem much branched, or with stem and panicle simple and slender.

25 **S. rupéstris** Raf. Smooth, slender; lvs. linear-lanceolate, plainly 3-veined; hds. small, in a simple panicle; fls. 15, rays very short. Rocky banks, Ind. Ky. 2—3f.

26 **S. Leavenwórthii** T. & G. St. minutely downy, very leafy; lvs. smooth, lin.-lanceolate, entire above; panicle open; heads rather large; ray and disk flowers each 10–12. Damp soils, South. 2—3 feet high.

27 **S. Missouriénsis** N. Low, simple; lvs. lance-lin., tapering both ways, shining, the lowest oblanceolate, with slender serratures; rac. small, dense; pedicels glabrous; hds. small, 12–15-flwd.; sc. with greenish tips; rays about 8. Dry prairies, Ill. Mo. 1–2f.

28 **S. serótina** Willd. St. terete, striate, tall; lvs. slightly serrate, lin.-lanceolate, veins beneath pubescent; ped. pubescent; hds. small, 15–20-flwd. Low grounds. 3–6f.

29 **S. gigántea** Ait. St. striate, tall; lvs. lanceolate, with sharp, spreading serratures; strongly 3-veined; pan. downy-hirsute; hds. 15–20-flwd. 4–7f. Generally much branched.

30 **S. Canadénsis** L. St. downy; lvs. lanceolate, acuminate, rough; hds. very numerous and small; fls. 12—17, rays short and obscure, about 7. Copses, hedges: com. 2–5f.

β. ***prócera.*** St. and lvs. beneath villous; hds. and rays larger. Low grounds. 4—7f.

31 **S. Shórtii** T. & G. St. minutely rough-downy; lvs. lance-oblong, acute, smooth; pan. contracted, elongated; sc. with greenish tips; fls. 10–15, rays 5–7. O. Ky. 2f.

32 **S. gracíllima** T. & G. Smooth, slender; lvs. lance-spatulate, obtuse, to linear, entire; panicle narrow, hds. 9–12-flowered, scales obtuse; rays 0. Barrens, Fla. 2f.

33 S. brachyphýlla Chapm. Pubescent; leaves spatulate to round-oval, serrulate; rac. spreading; scales obtuse, rigid; disk-fls. 3—5, rays 0. Dry soils, Ga. Fla. 3f.

34 S. altíssima L. Hairy, tall; lvs. lanceolate, very veiny, rough and wrinkled, the lower serrate; scales acute; rays 6—8. Fields: common. 3—5f. Variable.

35 S. Drummóndii T. & G. Minutely velvety; lvs. ovate or broad-oval, acute both ways, sharply serrate, veiny; scales oblong-obtuse; rays 4–5. Ill. opp. St. Louis. 1–2f.

36 S. rádula N. Rough-downy, simple; lvs. oblong-spatulate, tapering to base, serrate above, very rough and rigid; hds. small, rays 5, disk-fls. 3–6. Ill. to La. 1—2f.

37 S. amplexicaùlis T. & G. Rough-pubescent, subsimple; lvs. broad-cordate to ovate, serrate; petioles wing-clasping; rays 1—3. Dry woods, W. Fla. to La. 2—3f.

38 S. ulmifòlia Willd. Stem glabrous, with hairy branches; lvs. thin, elliptic-ovate, acuminate, serrate, tapering to base, smooth above, villous beneath; raceme recurved-spreading; hds. small, scales acute, rays 3—4, disk-fls. 3—4. Thickets, N. and W. 3f.

39 S. Bootii Hook. Stem glabrous, with hairy branches; lvs. ovate to lance-ovate, pointed at both ends, serrate; pan. long, loose; hds. middle-size, scales oblong, obtuse; rays 2—5, disk-flowers 8—12. Sandy soils, S. 2—3f.—Varies with stem downy.

40 S. linoìdes Sol. Smooth throughout, slender, simple; lvs. lanceolate, finely serrate; scales oblong-linear, obtuse; hds. small, rays 1—4, disk 4—5. Bogs, near Boston to N. J. 12—20′. Racemes of the panicle short, secund, at length spreading.

41 S. Muhlenbérghii T. & G. St. furrowed; lvs. smooth both sides, strongly serrate, ovate to lanceolate, pointed both ways; rac. axillary, remote, spreading; hds. 15–20-flowered, scales linear, obtuse. Damp woods, N. H. to Pa. 2—3f.

42 S. pátula Muhl. St. angular-striate; lvs. elliptic, acute, serrate, very rough above, the lower oblong-spatulate; panicle loose; scales obtuse, flowers 12–15. N. and W. 3f.

43 S. ellíptica Ait. Glabrous, leafy; lvs. elliptical, acute both ways, subserrate; pan. pyramidal; rays very short, 5—8, disk-fls. 6—7; scales obtuse. Marshes, R. I. to Ga.

β. ***Elliótii.*** Panicle more widely spreading. South. (S. Elliottii T. & G.)

44 S. argùta Ait. Strict; lvs. smooth, unequally serrate with divergent teeth, oblong-ovate to elliptical; pan. corymbous; rays about 10, disk-fls. 9—10; cyp. smooth. Woods, meadows: common. 3f. Plant smooth and shining.

β. ***júncea.*** Leaves lanceolate, upper entire; rays twice longer than involucre.

45 S. neglécta T. & G. St. striate; leaves lanceolate to linear, the lower divergent-serrate, long-stalked; panicle oblong or pyramidal; rays 6—10, disk-flowers 7—12; cypsela smooth. Swamps, Me. to Penn., and W. 3—4f. Root leaves 6—12′.

46 S. Ohiénsis Riddell. Entirely smooth; lvs. entire, lanceolate, flat, obtuse, to oblong-lanceolate, abruptly-acute, the lower on long stalks; hds. numerous, large, 15–20-flowered, rays about 6. Meadows and prairies, West N-Y. to Ind. and Wis. 2—3f.

47 S. Riddéllii Frank. Stout, nearly smooth; root lvs. very long, lance-linear, long-pointed, on long petioles, the cauline clasping, carinate, acute; heads 20–24-flowered, densely clustered in the level corymb. Wet prairies, O. to Mo., and N. 15—30′.

48 S. corymbòsa Ell. Glabrous, with the corymbous branches hirsute; lvs. sessile, lance-obl., thick, rigid, smooth; hds. large, rays 10, disk-fls. 20; fr. smooth. Ga. 4—6f.

49 S. Houghtónii T. & G. Low, smooth; lvs. lin.-lanceolate, acutish, flat, entire, tapering to base or petiole; hds. few, large, 20–30-flwd., rays 9 or 10. N. Y. Mich. 1—2f.

50 S. rígida L. Stout, rough-hairy; lvs. rigid, ovate to oblong, serrate, upper minute; hds. very large (4–5″), scales obtuse, rays 7–10, disk-fls. 25+. Dry. Ct., S. and W. 3–5f.

51 S. spithamæa Curt. Low, villous; lvs. lance-oval to oblong, thin, sharply serrate; hds. middle-size; scales lanceolate, acute; rays 6—8, disk-fls. 15—20. High mts. N. Car.

52 S. lanceolàta Ait. St. angular, hairy, much branched; lvs. lin.-lanceolate, entire, 3-veined; rays minute, about 17, disk-fls. 10. Meadows, copses: com. 2-4f. Fragrant.

53 S. tenuifòlia Ph. St. angular, smooth, much branched; lvs. narrowly linear, 1-veined, the axils leafy; corymb open, loose; rays about 10. Dry fields, coastward.

27. BIGELÒVIA, DC. Fls. 3—4, all tubular, ☿. Rays 0. Invol. cylindrical, as long as the flowers. Scales rigid, linear, closely imbricated.

Recep. pointed by a scale-like cusp. Fr. obconic, hirsute. Pap. bristles in one row. ♃ Glabrous, slender. Leaves alternate, entire. Heads fastigiately corymbous, with yellow flowers and colored scales.

B. virgàta DC.—Swamps, N. J. to Fla. and La. 1—2f. With virgate branches from base. Lvs. narrowly lin., 1-veined, the cauline lin.-spatulate. Sc. glutinous. Aug.-Oct.

28. **ISOPÁPPUS,** T. & G. Ray-fls. 5—12, ♀; disk-fls. 10—20, ☿. Scales of the invol. lance-subulate, closely imbricated. Recep. alveolate. Fr. terete, silky-villous. Pap. a single row of equal capillary bristles. ② Rough-hairy, branching, with alternate leaves and loose panicles. Aug.—Oct.

I. divaricàtus T. & G. Scabrous, hispid; lvs. lin.-lanceolate, taper-pointed each way; ped. slender, naked; rays 6–8, disk-fls. 10–13; pappus tawny. Dry. Ga. Fla. to Tex.

29. **HETEROTHÈCA,** Cass. Hds. ∞-flowered. Rays in one series, ♀; disk-fls. ☿. Scales imbricated, appressed. Recep. alveolate, fringed. Fr. minutely canescent, of the ray without pappus (naked), of the disk with a double pap., the outer very short, scale-like, the inner of capillary bristles. ♃ Hairy, corymbously branched, with alternate leaves and yellow flowers.

H. scàbra DC. St. flexuous, striate; lvs. scabrous, oblong-ovate, dentate; pet. wing-clasping; hds. large, rays 15–20; pap. tawny red, the outer white. S. 2–3f. Sept. Oct.

30. **CHRYSÓPSIS,** Nutt. Hds. ∞-flowered. Ray-fls. ♀; disk-fls. ☿. Invol. imbricate. Recep. subalveolate, flat. Pap. of the ray and disk similar, double, the exterior short, interior copious, capillary, brownish. Cyp. hairy, compressed. ♃ ② Hairy, with alternate and entire leaves and yellow flowers. Heads corymbous.

§ Leaves linear and lance-linear, grass-like, veined. Cypsela linear.........Nos. 1—4
§ Leaves oblong. Cypsela clavellate.—*a* Corymbs simple, umbel-like... ...Nos. 5—7
—*a* Corymbs compound or paniculate..Nos. 8–10

1 **C. graminifòlia** N. Canescent with long, silky hairs; stem leafy to the top; lvs. linear, the upper reduced; hds. many, large, loosely corymbed. Del. to Fla. 2f. Sept.

2 **C. oligántha** Chapm. Canescent with silky hairs; st. almost leafless above; hds. quite large, few, on slender peduncles; lvs. lance-lin. Damp sands, Fla. 2f. Apr. May.

3 **C. pinifòlia** Ell. Glabrous; lvs. narrowly linear to setaceous, rigid, erect; hds. solitary, few; cyp. villous; pap. reddish-brown, the outer whitish. Hills, Ga. 1–2f. Sept.

4 **C. falcàta** Ell. Villous; lvs. somewhat falcate, spreading, narrow; hds. small, in axillary corymbs; rays 3-toothed. Dry sands, Ms. to N. J. St. 8′, stout, leafy. Sep. Oct.

5 **C. Mariàna** N. Silky-arachnoid, simple; lvs. oblong-lanceolate, smooth when old, the lower spatulate, rather obtuse, upper reduced, acute; hds. about 7, large, 15–20-rayed; ped. and acute scales glandular. ♃ Barrens, N. J. to Fla. 2f. Sept.

6 **C. gossýpina** N. Cottony-tomentous, simple; lvs. uniform, ovate-oblong, obtuse, the lower tapering to base; hds. few, large; ped. short, glandular. ② Md. to Fla. in barrens. 1—2f. Lower leaves rarely sinuate-toothed. (C. dentata Ell.) Sept.

7 **C. villòsa** N. Villous-pubescent, leafy to top; lvs. acute, lower oblong-spatulate, upper oblong-linear, bristly-ciliate; hds. large, umbel expanded. Ill. to Ala. 2f.

8 **C. trichophýlla** N. Silky-villous, branching, leafy; lvs. oblong to lance-linear, the lower obtuse; corymb large; ped. and scales smoothish. ② Barrens, S. 2–3f. Sept.

9 **C. scabrélla** T. & G. Dusty-scabrous, stout, branched; lvs. oblong-lanceolate, the lower narrowed to base, upper acute; corymb large; ped. glandular. Fla. 2f. Oct.

10 **C. decúmbens** Chapm. Silky-villous, decumbent; lvs. lance-oblong, obtuse, with leafy axils, lower spat.-oblong; hds. very large, paniculate, glandular. Fla. 3-4f. Nov.

31. CONỲZA, L. GNATBANE. Fls. all tubular, those of the margin ♀, of the centre ♂ or ☿. Scales in several rows. Recep. flat or convex. Cyp. compressed. Pap. 1 row of (red) capil. bristles.—Herbs chiefly trop. Fls. yel.

C. ambígua DC. Cinereous-pubescent; lower lvs. sinuate-lobed, acute, middle repand-dentate, upper linear, entire; hds. panicled. Ga. S. Car. Ap.–Jl. § (C. sinuata Ell.)

32. ÍNULA, L. ELECAMPANE. Hds. many-flowered. Invol. imbricate. Ray-fls. numerous, ♀; disk-fls. ☿. Recep. naked. Pap. simple, scabrous. Anthers with 2 bristles at base. ♃ Coarse European herbs, with alternate leaves and very large yellow heads.

I. Helènium L. Lvs. amplexicaul, ovate, rugous, downy beneath; hds. solitary, terminal; sc. ovate. Pastures and roadsides, N. Eng. to Ill. 4–6f. Root lvs. 1–3f. Jl. Aug. §

33. PLÙCHEA, DC. MARSH FLEABANE. Hds. ∞-flowered; fls. of the margin ♀, of the centre ☿, but sterile. Invol. imbricated. Recep. flat, naked. Sty. undivided. Pap. capillary, simple.—Strong-scented herbs, with alternate leaves and corymbs of purple fls., and copious, reddish pappus.

1 **P. bìfrons** DC. Pubescent, leafy; lvs. oval-oblong, acute, finely serrate, cordate-amplexicaul, veiny; heads in compound, corymbous clusters. ♃ Damp, S. 2f.

2 **P. camphoràta** DC. Lvs. ovate-lanceolate, somewhat pubescent, acute, sessile or short-petioled, serrate; fls. in crowded corymbs; sc. viscid-downy, pointed. ① Salt marshes, Mass. to Fla. 1—3f. Stout, some fleshy, with upright branches. Aug. Sept.

3 **P. purpuráscens** DC. Glandular-tomentous; lvs. ovate-lanceolate, serrate, on slender petioles; hds. on slender ped.; sc. downy, acute. ① Swamps. 1–2f. Fla. Sept.

4 **P. fœtida** DC. Nearly glabrous, very leafy; lvs. broadly lanceolate, acute or acuminate at each end, petiolate, obtusely subserrate; heads numerous, in paniculate corymbs; scales smoothish, acute. ♃ Open hills, W. & S. 1—2f. Aug.—Oct.

34. BÁCCHARIS, L. GROUNDSEL TREE. Hds. discoid, ♂ ♀. Invol. imbricate, cylindric, or ovate, with subcoriaceous, ovate scales. ♂ Sta. exserted. Recep. naked. Pap. capillary. ♄ With alternate leaves and white flowers in Autumn.

1 **B. halimifòlia** L. Whitish-scurfy; lvs. obovate, incisely- or repand-dentate above, the highest lanceolate; panicle compound, leafy; fascicles pedunculate, terminal, in a dense panicle. Sea-coast, Conn. to Fla. 6—12f. A handsome shrub.

2 **B. glomeruliflòra** Pers. Minutely scurfy; lvs. all obovate, very obtuse, repand-few-toothed; heads in sessile, axillary glomerules. Coast, Va. to La. 3—6f.

3 **B. angustifòlia** Mx. Diffusely branched; lvs. linear, sessile, entire; hds. small, 15–20-flowered, cylindrical, axillary, loosely paniculate. Marshes, S. 6—10f.

35. PTEROCAÙLON, Ell. BLACK-ROOT. Hds. many-flowered, the fertile flowers ♀, in several rows, the sterile flowers central, mostly ☿. Sc. imbricated, caducous with the fruit, ♀ corollas 3-toothed, ☿ 5-cleft. Cyp. angular, hispid. Pap. of equal capillary bristles longer than the involucre. ♃ Rhizome tuberous. Leaves alternate, decurrent, and the stem winged. Heads sessile, crowded in a thick woolly spike.

P. pychnostáchium Ell. Simple; lvs. lanceolate, smooth above, cream-white-tomentous beneath, as well as one side of the wings of the stem. Sandy soils, S. 2–3f. Spike 2—3′. May—Aug. A curious plant.

36. BORRÍCHIA, Adans. SEA OX-EYE. Ray-fls. ligulate, ♀, fertile.

Scales imbricated, the outer leafy. Recep. flat, chaffy, the chaff rigid, persistent. Fr. 4-angular, crowned with a 4-toothed pappus. ♄ ♄ Maritime, with opposite leaves and solitary yellow heads.

1 **B. frutéscens** DC. Canescent, downy; lvs. oblanceolate, repand, obtuse-cuspidate, subconnate at base; chaff of the recep. rigidly cuspidate. Marshes, Va. to Fla. 1—3f.

2 **B. arboréscens** DC. Smoothish; lvs. spatulate, entire; chaff obtuse. S. Fla. 8f.

37. ECLÍPTA, L. Ray-fls. ♀, numerous, narrow; disk ☿, mostly 4-toothed. Scales 10—12, in two rows, leafy, lance-ovate. Recep. flat. Chaff bristly. Cypsela somewhat angular or 2-edged. Pap. 0. ① Strigous. Lvs. opposite. Heads axillary and terminal, solitary. Flowers white. Fig. 72.

E. alba (L.) Erect or diffuse, with short, appressed hairs; lvs. lance-oblong, tapering to each end, subserrate; ped. longer than the hds.; scales lanceolate. Damp soils, Ill. to Md., and S. 1-3f. Rays minute. (E. erecta L. E. procumbens Mx. Cotula alba L., &c.)

38. GALINSÒGA, R. & P. Rays 4 or 5, small, obtuse, ♀. Invol. scales 4 or 5, ovate, thin. Recep. conical, chaffy. Cyp. angular. Pappus of small, fringed scales, or 0. ① Leaves opposite, 3-veined. Heads small, with white rays and yellow disk-flowers.

G. parviflòra Cav. Lvs. ovate, acute, subserrate; pap. scales 8—16. A weed in cultivated grounds, coastward, Mass. to Penn. 1—3f. Summer. § S. America.

39. POLÝMNIA, L. LEAF-CUP. Involucre double, outer of 4 or 5 large, leafy scales, inner of about 10 leaflets, concave. Ray-flowers pistillate, few; disk sterile. Receptacle chaffy. Pappus none. ♃ Coarse and clammy. Leaves opposite. Flowers yellow.

1 **P. Canadénsis** L. Viscid-villous; lvs. petiolate, acuminate, lower pinnatifid, upper 3-lobed or entire, rays shorter than the invol. Can. to Car. and Ill. 3—5f. June.

2 **P. uvedàlia** L. Hairy and rough, stout; lvs. 3-lobed, acute, decurrent into the petiole, lobes sinuate-angled; rays 7—12, much longer than the involucre. In highland woods, N. Y. to Ill., and S. 3—6f. Lvs. very large (as also in No. 1). Hds. showy.

40. CHRYSÓGONUM, L. Rays about 5, ♀, fertile; disk ☿ but sterile. Scales in two rows of about 5 each, the outer leafy, the inner chaffy. Recep. flat, chaffy. Cyp. of the ray obcompressed, obovate, each embraced by a chaff scale, of the disk abortive. Pappus a small, 2–3-toothed crown. ♃ A little prostrate herb, with opposite leaves and solitary, pedunculate, bright yellow vernal flowers.

C. Virginiànum L.—In rich shady soils, Md. to Ill., and South. Acaulescent, finally caulescent. One of the earliest flowers of Spring.

41. SÍLPHIUM, L. ROSIN-WEED. Ray-fls. numerous, in 2 or 3 rows, fertile, outer row ligulate; disk-fls. sterile. Invol. campanulate. Scales in several series, leafy and spreading at summit. Recep. small, flat, chaffy. Cyp. broad, flat, obcompressed, crowned with a 2-toothed pappus. ♃ Stout, coarse, resinous herbs. Heads large. Flowers yellow. Summer.

* Stem nearly leafless, scape-like. Lvs. very large, alternate, mostly radical....Nos. 1—3
* Stem leafy.—*a* Leaves verticillate, in whorls of 3's, rarely 4's..............Nos. 4, 5 β.
—*a* Leaves opposite, rarely the highest scattered................Nos. 5—7
—*a* Leaves alternate (the lowest opposite or verticillate or alternate)..No. 8
—*a* Leaves connate-perfoliate..No. 9

1 **S. laciniàtum** L. *Polar Plant.* Very rough, with white, hispid hairs; leaves (18′) pinnately parted, petiolate, segments sinuate-lobed or entire; heads spicate, distant; scales ovate, appendaged and squarrous at apex. Prairies, W. 5—10f. July—Sept.

2 **S. terebinthinàceum** L. *Prairie Burdock.* St. glabrous; lvs. ovate to oblong, cordate, tooth-serrate, obtuse (1—2f); hds. panicled; scales round-oval; rays about 20; fr. winged. Prairies, W. and S. 4—8f. Exudes much resin. Hds. 1′ broad, rays 1′ long.

β. ***pinnatifidum.*** Lvs. more or less deeply lobed or pinnatifid. Prairies.

3 **S. compósitum** Mx. Glabrous throughout; slender, glaucous; lvs. cordate, variously sinuate-pinnatifid with lobed segments; hds. corymbed; fr. roundish-obcordate; rays about 10. Barrens, S. 3—6f. July, Aug. Varies with leaves only toothed. Hills.

4 **S. trifoliàtum** L. St. glabrous, terete or 6-angled; lvs. lanceolate, acute, short-petioled, in 3's or 4's, upper opp.; cyme loose; fr. oval, 2-toothed. Dry, O. to Fla. 4—6f.

5 **S. integrifòlium** Mx. Scabrous; st. 4-angled; lvs. opp., sessile, ovate-lanceolate, entire, cordate; corymb close; fr. broad-winged, 2-toothed. Prairies, W. and S. 2—3f.

β. ***ternàtum.*** Stem 6-angled; lvs. verticillate in 3's. With the common form.

6 **S. scabérrimum** Ell. Rough-hispid; lvs. rigid, oval, some pointed, serrate, petiolate, scales ciliate-serrulate; fr. roundish, broad-winged, deeply notched at apex. W. Ga. to La. 3—4f. Corymbed. Rays 20, spreading 2′. Fruit 6″. Aug. Sept.

7 **S. lævigàtum** Ell. Glabrous; lvs. lance-oblong, acute, serrate, petiolate; scales ciliate; fruit, large, oval, narrowly winged, emarginate. W. Ga. Ala. 2—3f. Heads small, loosely corymbed. Rays spreading, 1½′. Fruit 4″. Aug. Sept.

8 **S. Asteríscus** L. Hispid or hairy; lvs. lanceolate, crenate-serrate, petiolate; scales leafy; fruit broad-obovate, 2-toothed. Dry soils, Va. to Fla. 2—4f. June—Aug.

β. ***pùmilum.*** Downy, low; leaves elliptical; heads small; fruit truncate.

9 **S. perfoliàtum** L. *Cup-plant.* Stem square; leaves large, thin, ovate, forming a cup with their connate bases; heads on long peduncles; fruit broad-obovate, winged, notched. By streams, W. and S. 4—7f. Heads large. July, Aug.

42. **BERLANDIÈRA,** DC. Ray-fls. ♀, fertile, in one series; disk ☿ but sterile. Scales in three series, leafy, subequal. Recep. chaffy. Pales obtuse. Cyp. all marginal, in one row, obcompressed, wingless, obovate, adherent to the inner scales. Pap. minute. ♃ Velvety-canescent, with alternate, cordate, petiolate leaves and yellow rays.

1 **B. tomentòsa** T. & G. Caulescent, simple, white-tomentous; lvs. oblong, obtuse, crenate; heads in small, dense corymbs. Barrens, S. 1—2f. April—Aug.

2 **B. subacaùlis** N. Acaulescent, at length some caulescent, roughish canescent; lvs. sinuate-pinnatifid; scapes tall, bearing a single head. Ga. Fla. May, June.

43. **MÀDIA,** Molina. Invol. scales as many as the rays, complicate and embracing the compressed cypselæ. Recep. chaffy at its border. Rays 5—15, ♀; disk-fls. ☿, but often sterile. Pap. 0. ① Hairy and glandular.

M. ÉLEGANS. Lvs. lance-linear, sessile; heads corymbed; rays linear-cuneate, 3-toothed at apex, yellow, with a purple base. From California, very showy. (Madaria, DC.)

44. **SPHENÓGYNE,** Br. Invol. imbricate. Sc. with broad scarious tips. Recep. chaffy, pales embracing the flowers. Rays neutre; disk-fls. ☿. Cyp. hairy. Pap. of obtuse, contorted, chaff-scales.—S. Afr. Lvs. alternate.

S. SPECIÒSA. Leaves pinnatifid, with oblong cut segments; rays linear-oblong, spreading 2′, yellow, disk dark purple. ① 1f. Blooms profusely from July to Oct.

45. **PARTHÈNIUM,** L. Rays 5, very short, fertile; disk-fls. ∞, tubular, sterile. Invol. hemispherical. Sc. in two series, outer ovate, inner

orbicular. Recep. conical, chaffy. Cyp. 5, compressed, cohering with 2 contiguous pales. American herbs with alternate leaves. (Flowers white.)

1 **P. integrifòlium** L. Pubescent, rigidly erect; lvs. lance-ovate, coarsely dentate-crenate, coriaceous; hds. many, corymbed. ♃ Dry. Md., W. and S. 3—5f. Jl.—Sept.

2 **P. Hysteróphorus** L. Puberulent, decumbent; lvs. bipinnatifid, the upper linear; heads numerous, very small, in a diffuse panicle. River banks, Fla. to La.

46. IVA, L. MARSH ELDER. HIGHWATER SHRUB. Hds. discoid, monœcious. Invol. of 3—9 scales, distinct or partly united. Marginal fls. 1—5, fertile, the others sterile. Recep. chaffy. Cyp. obconic, obtuse. Pap. none. Herbs or shrubs. Lower lvs. opposite. Hds. small, greenish white.

1 **I. frutéscens** L. Shrubby; lvs. fleshy, lanceolate, coarsely serrate, upper lance-linear, entire; hds. axillary; scales 5, distinct, rounded; cypselæ 5. Borders of salt marshes, Mass. to Fla. 3—8f, bushy. Racemes paniculate, hds. drooping. July—Sept.

2 **I. ciliàta** Willd. Annual, hairy; lvs. lance-ovate, acuminate, coarsely toothed; hds. spicate; sc. 3, distinct, roundish, ciliate; cyp. 3. Wet. Ill. to La. 3—7f. Aug.—Oct.

3 **I. imbricària** Walt. ♃ Terete, glabrous; lvs. fleshy, linear-lanceolate, 3-veined, sessile; heads drooping, in leafy racemes; scales 6—9, obtuse, imbricated in 2 rows, with torn edges. Sea-coast, S. 1—2f.

47. AMBRÒSIA, Tourn. HORSE-WEED. Monœcious. Sterile involucre of several scales united into a depressed, hemispherical cup, many-flowered. Anth. approximate, but distinct. Fertile involucre 1-leaved, entire or 5-toothed, 1-flowered. Cor. 0. Sty. 2. Sta. 0.—Herbaceous plants with mostly opposite leaves and unsightly flowers. July—Sept. Figs. 73, 342.

§ Sterile heads sessile, densely spicate, chaffy. Leaves alternate............. .No. 1
§ Sterile heads pedicellate, racemed, not chaffy.—*a* Leaves opposite.............No. 2
—*a* Leaves alternate.... .....Nos. 3, 4

1 **A. bidentàta** Mx. Hairy and leafy, with simple branches; lvs. sessile or clasping, oblong, with a single tooth on each side near the base; fertile hds. axillary; fr. 4-angled, acutely pointed, the ribs produced into 4 short spines. ① Prairies, Ill. to La. 1–3f.

2 **A. trífida** L. Rough-hairy; lvs. 3-lobed, serrate, lobes oval-lanceolate, acuminate; fr. with 6 ribs ending below the conical top. ① Along streams, &c. 5—10f. Aug.

*β. **integrifòlia.*** Leaves ovate, acuminate, often some of them 3-lobed.

3 **A. artemisiæfòlia** L. *Hog-weed.* Lvs. twice-pinnatifid, smoothish, petioles ciliate; sterile hds. in panicled racemes, fertile axillary, sessile. ① Gardens, fields. 2-3f.

4 **A. psilostàchia** DC. Whitish, woolly, branching and leafy; lvs. rigid, the lower opp., bipinnatifid, upper pinnatifid; rac. spike-like; fr. hairy. ① Prairies, Wis. to Tex.

48. XÁNTHIUM, Tourn. CLOT-WEED. Monœcious. ♂ Hds. spicate above. Scales distinct, in one row. Anth. approximate, but distinct. Recep. chaffy. ♀ Invol. clustered below, 2-lvd., clothed with hooked prickles, 1- or 2-beaked, enclosing 2 fls. Sta. 0. ① Coarse weeds with alternate leaves.

1 **X. Strumàrium** L. Rough, unarmed, branching; lvs. cordate, lobed, 3-veined, unequally serrate; fruit elliptical, armed with stiff, hooked thorns, and ending with 2 spreading, straight horns. Fields, waysides, N., M. 2—3f. Aug. Unsightly.

2 **X. spinòsum** L. Whitish-downy, armed with triple, slender, subaxillary spines; lvs. lance-ovate, 3-lobed, dentate, or entire; ♀ invol. oblong. Waysides, &c. 2f. Sept.

49. MELÁNTHERA, Cass. Fls. all tubular, ☿. Scales in 2 subequal series. Recep. chaffy, the pales partly investing the fls. Cyp. short, truncate, angular. Pap. a few minute caducous awns or bristles. ♃ Scabrous, with square stems, opposite, petioled, 3-veined leaves and long peduncled heads. Corolla white. Anthers black, tipped with a white appendage.

1 **M. hastàta** Mx. Lvs. hastately 3-lobed, acuminate, dentate; sc. lance-ovate, acuminate, pales rigid, cusp-pointed. Dry soils, S. Car. to Fla., and W. 3—6f. Jl.—Sept.

2 **M. deltoìdea** Mx. Lvs. ovate-deltoid; scales ovate; pales or chaff obtuse. S. Fla.

50. **ZÍNNIA,** L. Ray-fls. ligulate, ♀; disk tubular, ☿. Sc. oval, margined, imbricate. Recep. chaffy, conical. Pap. of the disk of 1 or 2 erect, flat awns. ① American herbs, with opposite, entire leaves and solitary terminal heads. Rays bright-colored, showy.

1 **Z. multiflòra** L. Lvs. lance-oblong, sess.; peduncles scarcely longer than the lvs.; rays oval, shorter than the invol.; fr. 1-awned; pales entire. Fields, S. 6′–2f. May, Jn. §

2 **Z.** ÉLEGANS L. Lvs. ovate, cordate, sessile and clasping; peduncles much longer than the leaves; pales serrated; fruit 2-awned. Mexico. 2—4f. Fls. single or double, of all colors, often brilliant, blooming in gardens throughout the Summer.

51. **HELIÓPSIS,** Pers. OX-EYE. Invol. imbricate, with ovate, subequal scales. Rays linear, large, ♀; disk ☿. Recep. chaffy, conical, the pales lanceolate. Fruit 4-sided. Pappus 0. ♃ Leaves opposite. Heads large. Flowers yellow, like Helianthus.

H. lævis Pers. St. smooth; lvs. ovate-oblong to lanceolate, coarsely serrate, petiolate, 3-veined, smooth beneath. Hedges and thickets: common. 3—5f. June, July.
 β. grácilis. Slender, 2f; lvs. lance-ovate, scabrous, acute at base.
 γ. scabra. Stem and leaves scabrous, yellowish; leaves truncate at base. W. 6f.

52. **TETRAGONOTHÈCA,** Dill. Hds. radiate. Invol. double, the outer of 4 leafy bracts united at base, the inner of 8 small scales similar to the chaff of the conical receptacle. Ach. smooth, truncate, destitute of pappus. ♃ Clothed with viscid hairs, opposite leaves, with 1 or few yellow-flowered, large heads, on long peduncles.

T. helianthoìdes L.—Sandy soils, Va., and S. 3f, A stout, coarse, unsightly herb. Leaves ovate, sessile, repand-toothed. Rays spreading nearly 3′. April—June.

53. **ECHINÀCEA,** Mœnch. PURPLE CONE-FLOWER. Scales of the invol. in 2 or 3 rows. Ray-fls. neutral; disk-fls. ☿. Recep. conic, bristling with stiff, spiny pales. Cyp. 4-angled. Pap. a few teeth. ♃ Branches each with 1 large head. Leaves alternate. Rays rose-purple, drooping.

1 **E. purpùrea** Mœnch. Very rough; lower lvs. broad-ovate, 5-veined, cauline lance-ovate, acuminate, nearly entire; rays 12—15, very long (2—3′), bifid. Thickets, W. and S. 4f. July-Sept.—Varies in roughness, and with white rays.

2 **E. angustifòlia** DC. St. hispid, slender; lvs. all entire, hispid-pubescent, 3-veined, lanceolate to lance-linear; rays 12—15, narrow, 1—2′ long. Prairies and marshes, Ill. Mo., and S. 2—3f. Rays sometimes white. May—July.

3 **E. atrorùbens** N. Smooth or rough; stem simple, furrowed; lvs. lance-linear to linear, rigid, the lower 3-veined; rays 8—11, shorter than the disk (1′); scales in 3 rows; pappus of 4 teeth. Damp barrens, Ga. Fla., and W. 2f. June—Aug.

54. **RUDBÉCKIA,** L. Invol. scales nearly equal, leafy, in a double row, 6 in each. Ray-fls. neutral; disk ☿. Recep. conic or columnar, with

unarmed pales or chaff. Cyp. 4-angled. Pap. a lacerate or toothed margin, or 0. ♃ Leaves alternate. Heads large. Rays yellow.

§ Rays large, drooping.—*a* Leaves divided. Disk ovoid or rounded..........Nos. 1, 2
—*a* Leaves undivided. Disk columnar............. ..Nos. 3, 4
§ Rays spreading. Disk dark purple, conical or rounded...(*b*)
b Leaves deeply lobed or parted, the upper undivided...................Nos. 5, 6
b Leaves undivided.—*c* Pales of the disk whitish downy....... ....Nos. 7, 8
—*c* Pales dark purple as well as the flowers........Nos. 9—12

1 **R. laciniàta** L. Glabrous; lower leaves pinnate, segments 3-lobed, upper leaves ovate; disk ovoid, yellowish, pales truncate. Swamps. 3—5f. Rays near 2′. Aug.

2 **R. heterophýlla** T. & G. Downy; lvs. coarsely toothed, 3-5-lobed or parted, the lowest often round-cordate, highest ovate; disk globous; pales acute. Fla. 4f. Aug.

3 **R. máxima** N. Glabrous; leaves thin, ample, oval to oblong, subentire, the upper clasping; head solitary, on a long ped.; rays 2′. Wet barrens, Fla. to La. 7f. Aug.

4 **R. nítida** N. Glabrous and shining; leaves thick, lanceolate, acute, 3-5-veined; heads few or solitary; disk brown; rays 9—12, near 2′. Swamps, S. 4f. July.

5 **R. subtomentòsa** Ph. Tomentous-downy, corymbous; leaves serrate, the lower 3-parted or lobed, upper ovate; disk globular; pales bearded, obtuse; rays 10—15, orange-yellow, 1′. Prairies, W. and S-W. 3—5f. July, Aug.

6 **R. tríloba** L. Hairy, paniculately branched; lvs. coarsely serrate, 3-lobed to ovate-lanceolate, the lowest cut-pinnate or undivided; hds. rather small, disk conical, dark purple; pales smooth, awned. Fields. M., W. 3—4f. Aug. Sept.

7 **R. mollis** Ell. Soft-woolly all over; lvs. oblong, sessile or clasping; sc. reflexed; disk dark purp., with canescent pales; rays 15-20, 1′. W. Ga. 2-3f. Lvs. small. Aug.-Oct.

8 **R. Heliópsidis** T. & G. Slightly downy; lvs. ovate or oval, 5-veined, petiolate; sc. obtuse, squarrous, rays 10—12; pales canescent. W. Ga. and Ala. 1-2f. Aug. Sept.

9 **R. hirta** L. Very rough-hairy; ped. leafless; lvs. ovate-spatulate, 3-veined, petiolate, mostly entire, upper ones sessile, lance-ovate; scales in 3 rows; rays oval, 12—15; disk rounded, dark brown; pales bearded. Fields. 2f. Showy. July—Sept.

10 **R. fùlgida** Ait. Rough-hirsute; branches leafless above; lvs. ovate to lance-oblong, remotely dentate, lower petiolate; scales oblong, spreading as long as the 12—14 orange rays; pales glabrous, lin.-oblong, obtuse. Mts. Pa. to O., and S. 1-3f. July-Oct.

11 **R. speciòsa** Wend. Hairy and downy; branches slender, leafless above; lvs. strongly dentate, acuminate, ovate to lanceolate, 5-3-veined, lower long-petiolate; sc. much shorter than the 18 rays; pales smooth, acute. Ill. to Va. 2—4f. Aug.—Oct.

12 **R.** AMPLEXIFÒLIA. ① Branching, glabrous; lvs. cordate-clasping; rays spotted at base, brilliant. La. (Dracopsis.)

55. LÉPACHYS, Raf. Invol. in one series of linear scales. Ray-fls. few, neutral; disk ☿. Recep. columnar, chaffy. Chaff obtuse, and bearded at apex. Pap. 0. Fertile achenia compressed, 1–2-winged. ♃ Lvs. alternate, pinnately divided. Hds. with long, drooping, yellow rays. June–Sept.

1 **L. pinnàta** T. & G. Rough; lvs. all pinnate, divisions 5—7, 2-parted or entire; rays light yellow, twice longer than the ovoid yellowish disk. W. N-Y., W. and S. 2-4f.

2 **L. columnàris.** Rough, branching; root lvs. undivided, oblanceolate; stem lvs. pinnatifid; disk nearly 2′ long, longer than the 5—8 broad rays, which, in Variety pulcherrima, are crimson, tipped with yellow. Montana. 2f.

56. HELIÁNTHUS, L. SUN-FLOWER. Ray-fls. neutral; disk ☿. Sc. of the invol. imbricated in several series. Recep. flat or convex, the chaff persistent, embracing the fruit. Pap. of 2 or 4 chaffy awns, mostly deciduous. Fruit compressed or 4-angled. ① ♃ Rough. Lvs. opposite, the upper often alternate, mostly tripli-veined. Rays yellow; disk yellow or purple: in late Summer and Autumn. Figs. 74, 261, 433–4.

§ HELIANTHÉLLA (T. & G.) Pap. persistent. Lvs. scattered, 1-veined.....Nos. 24, 25
§ HELIÁNTHUS *proper.* Pappus deciduous. Lower leaves opposite...(*)
* Disk (its corollas and pales) dark purple, mostly convex...(*a*)
a Herbs annual. Leaves chiefly alternate..........................Nos. 1, 2
a Herbs perennial. Leaves opposite.—*e* Scales acuminate..........Nos. 3—5
—*e* Sc. obtuse or barely acute..Nos. 6, 7
* Disk (its corollas and pales) yellow...(*b*)
b Leaves chiefly alternate and feather-veined.......................Nos. 8—11
b Leaves chiefly opposite and 3-veined or tripli-veined...(*c*)
c Scales erect, closely imbricated.—*f* Plants green, rough......Nos. 12, 13
—*f* Plants whitish, downy...Nos. 14, 15
c Scales loosely spreading. Heads large, 9–15-rayed...(*d*)
d Scales lance-linear, longer than disk. Leaves thin......Nos. 16, 17
d Scales lance-ovate, as long as the disk. Leaves thick...Nos. 18—21
c Scales loosely spreading. Heads small, 5–8-rayed............Nos. 22, 23

1 **H. ánnuus** L. *Great Sunflower.* Erect, stout; lvs. all cordate, only the lowest opposite; hds. very large (6—12′), nodding; fr. glabrous. Gardens and fields. 2—10f. § S. America.—A variety with the flowers all ligulate is sometimes found in gardens.

2 **H. débilis** N. Decumbent, slender; leaves mostly alternate, ovate, serrulate, petiolate; hds. small; scales with slender points; fr. pubescent. Shores, E. Fla. to La. 1–2f.

3 **H. Rádula** T. & G. Hirsute, simple, bearing a single head; lvs. roundish-obovate or ovate, obtuse; scales and pales lanceolate, acuminate, erect; rays 7—10, rarely 0. ♃ Barrens, Ga. Fla. Ala. 1—3f. Often growing in clusters. Hds. near 1′. Aug. Sept.

4 **H. heterophýllus** N. Slightly hispid, slender, bearing a single head; lvs. entire, the lower oval, upper linear-lanceolate; scales acuminate, erect, ciliate; pales acute; rays 12—18. ♃ S. 1—2f. Heads 6″ diam., rays spreading 2½′. Aug. Sept.

5 **H. angustifòlius** L. Erect, slender, scabrous or hispid; lvs. lance-linear, tapering to a long point, 1-veined, rigid; heads few; scales lance-linear, the long point spreading; pales linear, 3-toothed. Dry soils. N. J., Ky. and S. 2—3f. Aug.—Oct.

6 **H. rígidus** Desf. Rigid, subsimple; lvs. lanceolate, pointed, rough both sides; hds. few; scales ovate, acute, short; rays 12—20. Prairies, Wis. Mo. to La. 2—3f.

7 **H. atrorúbens** L. Ped. few, long, leafless; st. hirsute below; lvs. ovate or oval, obtusish, on winged petioles; sc. oblong, obtuse, 3-veined. Dry soils. S. 2—4f.

8 **H. gigánteus** L. Rough or hairy; lvs. lanceolate, serrate, pointed, on ciliate, winged petioles; scales lance-linear, ciliate; rays 12—20; pappus of 2 short, fringed scales Can. to Car. and Ky. 4—10f.—Varies with the leaves mostly opposite.

9 **H. tomentòsus** Mx. Stout, pubescent, branched; lvs. ovate to long-lanceolate, acuminate, subentire, the lower petiolate; scales long-pointed, villous, spreading; pales hairy and 3-toothed at top. Dry hills, Ill. to Ga. 4—8f. Rays 15″.

10 **H. grosse-serràtus** Martens. St. smooth and glaucous; lvs. lanceolate or lance-ovate, long-acuminate, sharply serrate, downy beneath, on winged stalks; scales loose, subulate, as long as the disk; rays 15—20. W. and S. 4—6f.

11 **H. tuberòsus** L. *Jerusalem Artichoke.* Root bearing oblong tubers; lvs. cordate-ovate to ovate, acuminate; petioles ciliate. Fields, hedges. 4f. § Brazil.

12 **H. lætiflòrus** Pers. St. branched above; lvs. thick, lance-oval, pointed, serrate, on short stalks; scales ovate-lanceolate; rays 12—20, 2′. Woods, W. and S-W. 3—4f.

13 **H. occidentàlis** Riddell. Slender, simple, nearly naked above; lvs. oval, subserrate, on long hairy petioles; hds. 1—5, small; scales lance-oval. Sandy. W. 3f.

14 **H. mollis** Lam. Canescent-tomentous, subsimple; lvs. ovate, sessile, cordate-clasping, acuminate; sc. lanceolate; pales entire, acute; rays 15—25. O. to Mo. 2—4f.

15 **H. cinèreus,** β. ***Sullivántii*** (T. & G.) Cinereous-pubescent; stem virgate, branched above; lvs. ovate-oblong, narrowed to the sessile base, the lower to a winged petiole; pales pointed, with 2 lateral teeth; rays about 20. Ohio. 2—3f.

16 **H. decapétalus** L. Lvs. all opposite, thin, ovate, acuminate, toothed, on winged stalks, scabrous above, smoothish beneath.—Varies with the invol. scales enlarged and leaflike, or only lance-linear. Can. to Penn. 3—4f.

17 **H. tracheliifòlius** Willd. Branch lvs. alternate, thin, appressed-serrate, acuminate, all ovate to lance-linear; pales 3-toothed; rays 12—15. Thickets, W. 3—8f.

18 **H. doronicoìdes** Lam. Branching; lvs. ovate to lance-ovate, acuminate, serrate; scales lance-linear; rays 12—15, 1½′, very showy. W. and S. 4—7f.

β. ***plena-flora.*** Flowers all ligulate. Gardens. Very handsome.

19 **H. strumòsus** L. Smooth below; lvs. all similar, ovate-lanceolate, acuminate, serrulate; heads few, about 10-rayed; scales ciliate, squarrous. Swamps. 3—5f.

20 **H. hirsùtus** Raf. St. simple or forked, hirsute; lvs. petiolate, ovate-lanceolate, subserrate, hirsute beneath; scales lance-ovate, hairy; rays 11—15. Dry, W. and S. 6f.

β. ***pubéscens.*** Leaves tomentous beneath, subsessile. (H. pubescens Hook.)

21 **H. divaricàtus** L. St. smooth, simple, or forked; lvs. rough, lance-ovate, long-pointed from an abrupt sessile base; heads few, corymbous. Woods, &c. 4—5f.

β.? ***scabérrimus.*** Stem subsimple; leaves thick, exceedingly rough and rigid, opposite or ternately verticillate, rounded at base. W.

22 **H. microcéphalus** T. & G. St. smooth or hispid, branched; lvs. lanceolate, acuminate, narrowed to a short petiole, rough above, whitish-downy beneath; scales lanceolate; rays 5—8, spreading 1′. Dry, W. and S. 3—5f. (H. Schweinitzii T. & G.)

23 **H. longifòlius** Ph. Smooth throughout, branching; lvs. lance-oblong to lance-linear, acute, the lowest petiolate, serrulate; heads few; scales ovate-lanceolate; rays 6—10, spreading 1½—2′. Damp. S. 3—5f. (H. lævigatus T. & G.)

24 **H. grandiflòrus.** Rough-downy; simple, leafy; lvs. 1—2′, lance-linear, sessile; scales lanceolate, loose; rays 15—20, near 2′; pappus 2 fringed scales. E. Fla. 3f.

25 **H. tenuifòlius.** Rough-hairy, simple; lvs. narrow-linear; scales lance-subulate, loose; rays 10—13 (15″); pappus 2—4 awns. W. Fla. 1—2f. Leaves 2—3′. July.

57. ACTINÓMERIS, Nutt. Heads many-flwd.; ray-fls. 4—14, rarely 0. Invol. scales foliaceous, subequal, in 1—3 series. Recep. conical or convex, chaffy. Ach. compressed, flat, obovate, mostly winged and 2-awned. ♃ Plants tall, with 3-veined, serrate leaves. Heads corymbous. Rays when present yellow. Autumn.

§ ACTÍMERIS. Pappus of 2 awns. Stems tall, corymbous...(*a*)
§ ACHÆTA. Pappus wanting. Cypsela winged. Stems low, simple. Jn. Jl....No. 1
a Rays wanting. Disk corollas white. Stem narrowly winged..............No. 2
a Rays 4—14, flowers all yellow. Scales in 2 or 3 series................Nos. 3—5

1 **A. pauciflòra** N. Lvs. opp. or alternate, lanceolate to elliptical, rigid, obtuse; hds. 1—3, discoid, yellow; fr. narrowly winged, the disk cupshaped. Barrens, Fla. 1—2f.

2 **A. alba** T. & G. Lvs. narrow-lanceolate, acute both ways, serrulate; scales lance-linear, few, in one series; fruit broadly winged. S. Car. to Fla. and La. 7f.

3 **A. helianthoìdes** N. Stem winged; lvs. alternate, ovate-lanceolate, decurrent, acuminate, serrate, rough, hairy; rays 1′ long, 6—14, unequal; scales erect; fruit narrowly winged. Copses, prairies, Ohio to Ga., and W. 2—4f. June, July.

4 **A. squarròsa** N. Stem winged, tall (6—10f); lvs. alternate, some opposite, lance-oblong, long (6—14′), pointed both ways, decurrent; heads small; scales spreading or deflexed; rays 4—8, regular, short. Alluvion, N. Y., W. and S. Homely.

5 **A. nudicaulis** N. Stem wingless, branched and leafless above; lvs. oblong, unequally serrate, closely sessile; rays 7—12, broadly winged. Ga. Fla. Ala. 2—3f.

58. CORIÓPSIS, L. TICK-SEED. Rays about 8, rarely 0. Involucre double, each 6–12-leaved. Recep. chaffy. Cyp. obcompressed, emarginate, each commonly with a 2-toothed, upwardly-hispid pappus, sometimes none. Leaves mostly opposite. Rays usually yellow; disk-flowers yellow or dark purple.

§ Corollas of the disk dark purple...(*a*)
  a Ray-flowers yellow with a purple base. Achenia incurved..............Nos. 1—3
  a Ray-flowers wholly yellow. Achenia not incurved, 2-awned. Summer....Nos. 4—6
§ Corollas of the disk yellow. Rays rose-colored. Leaves simple.............Nos. 7, 8
§ Corollas of the disk and ray all yellow (disk brownish in No. 9)...(*b*)
  b Leaves sessile, divided often so as to appear verticillate................Nos. 9—12
  b Leaves petiolate, never serrate,—*c* pinnate with lance-linear segments..Nos. 13, 14
    —*c* simple, or rarely auricled below....Nos. 15, 16
  b Leaves petiolate, serrated,—*d* simple. Achenia awns obsolete........Nos. 17, 18
    —*d* compound.—*e* Rays about 8............Nos. 19—21
      —*e* Rays wanting............Nos. 22, 23

1 C. DRUMMÓNDII. ① Pubescent; lvs. pinnately (1–5)-divided; segm. oval or oblong, entire; sc. lance-acuminate; rays unequally 5-toothed. Tex. 1-2f. Rays ample, showy.
  β. ***atrosanguínea.*** A garden variety, with the rays wholly dark purple. July–Oct.

2 C. TINCTÒRIA. ① Glabrous; lvs. alternate, some pinnate; lobes lin.-oblong and linear; scales very short, acute; rays 3-lobed at apex. Nebraska. 1–3f. Beautiful. Summer.

3 C. ATKINSONIÀNA. ♃ Lf. lobes linear-spatulate to linear; sc. oblong, obtuse; rays 3-lobed; fr. distinctly winged. Columbia River, Oreg. Hds. handsome, like C. tinctoria.

4 C. gladiàta Walt. St. terete; lvs. alternate, thick, some ternately divided, lance-oblong to lance-linear; outer scales lance-ovate; fr. fringed, awns 2, slender; rays 3-toothed at the dilated apex. Moist barrens, S. 2—3f. Heads several, corymbed.

5 C. angustifòlia Ait. St. square; lvs. opposite (mostly), undivided, spatulate to linear, obtuse; outer sc. ovate, obtuse; fr. wing-fringed, awns 2, short; rays 3-lobed. S.

6 C. Æmleri Ell. St. angular above; lvs. opp., lance-ovate to lanceolate; outer scales oblong, obtuse; fruit margined, ciliate, the 2 awns very short. Ga. (Elliott) and Fla.

7 C. nudàta Nutt. Very slender; lvs. few, terete, rush-like, alternate, the lower very long; hds. few; rays wedge-obovate, crenate-lobed at apex. ♃ Swamps, Ga. Fla. 2f.

8 C. rosea N. Branching; lvs. opp., 1-veined, linear; ped. short; outer sc. very short; rays oblong, obscurely tridentate. ♃ Wet grounds, Ms. to Ga. 8–16′. Delicate. Jl. Aug.

9 C. senifòlia Mx. Minutely downy or glabrous; lvs. opposite, ternate, sessile, appearing in whorls of 6; lfts. ovate-lanceolate, varying to linear-lanceolate or even to linear; scales downy, obtuse; rays entire. ♃ Dry, Va. Ky. to Ga. 1—2f. July, Aug.

10 C. delphinifòlia Lam. Lvs. opp., sessile, divided into lfts. which are each again 2–5-parted; seg. linear, entire, acute; disk-fls. brown at the tips. ♃ Va. to Fla. 2f. Aug.

11 C. verticillàta L. Branched; lvs. 3-divided, closely sessile, the divisions 1–2-pinnately-parted; seg. filiform-lin.; rays 1–3-toothed. ♃ Moist, Md. to Ga. 1–3f. Jn.–Aug.

12 C. palmàta N. St. angled, striate, leafy to top; lvs. sessile, deeply 3-cleft, rigid; lobes linear, acutish, entire or again cleft; fr. linear-elliptic. ♃ Prairies, W. 1–2. July.

13 C. trípteris L. St. simple, tall, corymbous; lvs. opp., stalked, thick, 3–5-divided; seg. lin.-lanceolate, entire, acute; hds. small; rays obtuse. ♃ Dry, W. and S. 4–8f. Jl.

14 C. grandiflòra N. St. low; hds. solitary, large, on long naked stalks; lvs. lanceolate, mostly divided into lance-lin. seg.; rays 4–5-cleft. ♃ Mo. to Tex. Much like No.15.

15 C. lanceolàta L. Ascending; lower lvs. oblanceolate, upper lanceolate, all entire; heads solitary, on long naked peduncles; rays 4–5-toothed. ♃ Damp soils, West and South. Head showy. Rays about 8, spreading 2′ or more. June—Aug. †

16 C. auriculàta L. Lower lvs. round-ovate, petiolate, some of them with 2 small lateral segm. (auriculate) at base, the upper oblong, subsessile; hds. few, on long ped., outer scales oblong-linear. Dry soils, Ill. to Va., and S. 1—3f. May—Aug.

17 C. latifòlia Mx. Very glabrous, tall; lvs. thin, opp., ovate to oblong, acuminate, unequally toothed; hds. small, rays 5 or 6, entire, large; sc. lin., spreading. Mts. S. Aug.

18 C. argùta Ph. Stem strict; lvs. simple, ovate to lanceolate, petiolate, acuminate, sharply serrate; scales oblong; rays 9—12, 3-toothed; awns obsolete. Hills, S. 2—5f.

19 C. aurea Ait. Lower lvs. pinnately divided, upper ternately, or simple; lfts. ovate to lance-linear, serrate; rays 6—9, obtuse; fruit toothed. Ditches, S. 2-4f. Aug.-Oct.

20 C. aristòsa Mx. Sparingly pubescent; lvs. pinnately 5-9-parted, segm. lance-lin., incised; hds. small, rays large; outer scales 10—12, linear; awns slender, spreading, as long as the fruit. ② Low woods, W. 2—3f. Rays expanding 18″. Aug.—Oct.—Varies with the outer involucre leafy; and with the awns short, &c.

21 C. trichospérma Mx. Stem glabrous, square, dichotomous; lvs. pinnately 5-7-parted, segm. lanceolate, cut; rays entire, large; cyp. narrowly cuneate, with 2 short, stout awns. ① Wet grounds, Mass. to Ill. (J. Wolf), and Car. 1-2f. Fls. showy. Jl. Aug.

22 C. discoìdea T. & G. Glabrous, much branched; leaves ternate, long-petiolate; lfts. lance-ovate, dentate; hds. small (2—3″); fr. linear-cuneate, the 2 stout awns (upwardly hispid) half as long and equalling the corolla. ① Wet, W. and S. 1-3f. Jl.-Sept.

23 C. bidentoìdes N. Glabrous, paniculate; lvs. simple, lanceolate, serrate; heads 7-10″; fr. lin.-oblong, the slender (up-hispid) awns longer than cor. ① Pa. Del.: rare.

59. BIDENS, L. BURR-MARIGOLD. Invol. double. Scales somewhat similar, or the outer foliaceous. Rays 4—8 (sometimes none), neutral; disk-flowers perfect. Recep. chaffy, flat. Pap. of 2—4 awns, rough backwards. Cypsela obcompressed, obscurely quadrangular. Leaves opposite, incised. Flowers yellow. July—October.

§ Cypsela linear-subulate, tapering to the top, 3-4-angled, 2-6-awned........Nos. 1—3
§ Cypsela oblanceolate, broader at the top, flat, 2-4-awned..................Nos. 4—7

1 B. leucántha Willd. Lvs. in 3—5 serrate lobes; hds. with 5 white rays. S. Fla. 1f.

2 B. bipinnàta L. *Spanish Needles.* Lvs. bipinnate, lfts. lanceolate, pinnatifid; rays very short, obovate, 3, 4, or 0; sc. all equal in length. ① Waste grounds, Ct. to Ill. 2-4f.

3 B. Beckii Torr. St. subsimple; submersed lvs. capillaceous-multifid, emersed lvs. lanceolate, connate, acutely serrate or cut; rays longer than the involucre. ♃ Slow waters, Vt. (rare), W. and N. Stem 2—3f. Heads solitary, terminal.

4 B. frondòsa L. *Beggar-ticks.* Rays 0; outer sc. leafy, 6 times longer than the fls.; lower leaves pinnate, ternate, upper lanceolate, serrate; awns 2. ① Fields: com. 2f.

5 B. connàta Willd. Rays 0; outer sc. leafy, longer than the head; lvs. lanceolate, serrate, subconnate at base, lower some trifid; awns 3. ① Swamps, E. and W. 1—3f.

6 B. cérnua L. Rays 0—4—8, small; hds. *cernuous;* outer scales as long as the disk; leaves all lanceolate, subconnate, dentate. ① Swamps, ditches, E. and W. 1—2f.

7 B. chrysanthemoìdes L. Lvs. oblong, attenuate at each end, connate at base, regularly serrate; rays thrice longer than the involucre. ① Ditches: common. 6′-2f.

60. SPILÁNTHUS, L. Invol. shorter than the disk, double, appressed. Recep. conical, chaffy, the pales embracing the flowers. Cyp. of the disk compressed, with 1—3 bristly awns or awnless, of the ray (when present) 3-angled. Herbs with acrid taste, opposite leaves, and solitary, yellow heads. Chiefly tropical. Aug.—Oct. (Acmella, Rich.)

1 S. repens Mx. Diffuse, rooting at the lower joints; lvs. lanceolate, subserrate, acute at each end, petiolate; rays about 12; fr. awnless, not ciliate. ♃ Wet, S. Car. to Fla.

2 S. Nuttállii T. & G. Ascending, diffuse; lvs. ovate to oblong, coarsely serrate, abruptly petiolate; fruit ciliate on the margins; rays 10-12. Bogs, E. Fla. 1-2f.

61. VERBESÌNA, L. CROWN-BEARD. Rays ♀, few or none; disk ☿. Sc. in 2 or more series, imbricated, erect. Chaff concave or embracing the flowers. Achenia compressed, 2-awned. ♃ ♄ Leaves often decurrent serrate or lobed. Heads solitary or corymbous.

1 V. Siegisbeckii Mx. Stem 4-winged; lvs. opposite, ovate, serrate, acuminate, 3 veined, tapering to the winged petiole; hds. corymbous, yellow; rays 1-5; fr. wingless. ♃ Dry, W. and S. 5f. Aug. Sept.

2 **V. Virgínica** L. Stem narrowly winged; lvs. alternate, lance-ovate, subserrate, feather-veined, tapering to the sessile base; rays 3—4, white; fruit narrowly winged. ♃ Dry woods, Pa. to La. 4f. August.

3 **V. sinuàta** Ell. St. wingless, striate-angled; lvs. alternate, ovate, acuminate, contracted to a long slender base and petiole, irregularly repand-toothed or lobed; rays 3—5, white; fr. broadly winged. ♃ Sandy fields, S. 2-4f, with ample lvs. Sept.—Nov.

62. **DYSÒDIA,** Cav. FALSE DOG-FENNEL. Rays ♀, disk ♂. Invol. a single series of partially united scales, usually calyculate. Cyp. elongated, 4-angled, compressed. Pap. scales chaffy, in 1 series, fimbriately and palmately cleft into bristles. ① With large, pellucid glands. Lvs. mostly opp., pinnately parted or toothed. Hds. paniculate or corymbous. Fls. yellow.

D. chrysanthemoìdes Lagasca. Smooth, much branched; lvs. pinnately-parted, lobes linear, toothed; hds. with few very short rays. Prairies and waysides, W., migrating E. 1f. An ill-scented plant. Aug. Sept.

63. **GAILLÁRDIA,** Foug. Rays neutral. Scales in 2 or 3 series, acute, leafy, spreading, outer largest. Recep. convex, fimbrillate (naked in No. 1). Rays cuneiform, 3-cleft. Cyp. villous with long hairs from its base. Pappus of 6—10 long awns, which are membranous at base.—Leaves alternate, entire, often dotted. Heads on long, naked peduncles. May—Aug.

1 **G. lanceolàta** Mx. Lvs. lanceolate to linear; sc. as long as the dark purple disk; rays 8—10, small, yellow; *recep. naked.* ② Barrens, S. Car. to Fla. and Tex. 1-2f.

2 **G.** PICTA. Lvs. lanceolate; sc. hairy, longer than disk; rays 10-12, violet-purple with yellow teeth; recep. fimbrillate with slender awns. ① ♃ Dak. to Tex. 2f. Handsome.

64. **GAZÀNIA,** Gært. Rays neutral, disk-fls. ☿. Sc. in several rows, united at base. Cyp. wingless, densely hairy. Pap. chaffy. Recep. alveolate. —From S. Africa. Hds. solitary, showy, on naked stalks. Rays tricolored.

G. SPECIÒSA. Trailing, half-shrubby; leaves oblong, entire or pinnatifid, smooth above, white-tomentous beneath; rays (1') orange-yellow, each with an eye of white and chocolate at its base. Singularly beautiful.

65. **PALAFÓXIA,** Lagasca. Rays ♀ or 0. Sc. 8—15, scarious at tip, shorter than the disk. Recep. flat, naked. Cyp. 4-angled, slender at base. Pap. of 6—12 membranous, denticulate, pointed scales. ♃ ♄ With scattered, narrow, entire lvs. and cyanic fls. in a corymb. (Polypteris, N.) Jl.-Sept.

P. integrifòlia T. & G. Rough; lvs. lance-linear, 1-veined; rays none; pap. of 8—10 pointed scales with fringed edges. Barrens, Ga. and Fla. 3—5f. Heads purplish.

66. **HYMENOPÁPPUS,** L'Her. Fls. all ☿, tubular. Sc. 6—12, in 2 series, oval, obtuse, colored. Recep. small, naked. Anth. exserted. Cyp. broad at the summit, attenuate to the base. Pap. of many, short, obtuse, membranous scales in 1 series. ② ♃ Hoary-villous. Stem grooved and angled. Leaves alternate, pinnately divided.

H. scabiosæus L'Her. Leaf segm. linear-oblong; corymb simple; sc. obovate, white, greenish at base, longer than the disk; fr. pubescent. W. and S. 1—2f. Apr.—June.

67. **HELLÈNIUM,** L. Rays ♀ or neutral, 3-5-cleft at the expanded

summit. Disk-fls. ☿. Invol. small, scales linear to filiform, reflexed. Recep. naked, convex to oblong. Cyp. angled, clavate or turbinate. Pap. of 5—12 silvery, thin scales.—Herbs with alternate, often decurrent leaves, punctate, resinous. Heads corymbous or solitary, showy, yellow.

§ HELLENIÁSTRUM. Rays pistillate. Pappus awned. Heads corymbed...(*a*)
a Disk globular, its corollas 5-toothed. Pappus awned..................Nos. 1—3
a Disk oblong, its corollas 4-toothed. Pappus scales obtuse................No. 4
§ LEPTÓPODA. Rays mostly neutral and fruitless...(*b*)
b Heads corymbed, on short peduncles. Pappus awned. Disk globous......No. 5
b Head solitary, on a long ped. Disk convex.—*c* Cypsela glabrous......Nos. 6, 7
—*c* Cypsela hairy........Nos. 8—10

1 **H. autumnàle** L. St. strongly winged; lvs. lanceolate, serrate, decurrent, heads loosely corymbed. ♃ Damp. 2–3f. Hds. large, with drooping rays. Sept. Very bitter.

2 **H. parviflòrum** N. St. scarcely winged; lvs. lanceolate, subentire, slightly decurrent; sc. filiform, shorter than the globular disk; hds. small, few. Ga. (Nuttall.) Scarce.

3 **H. tenuifòlium** N. St. and numerous fastigiate branches wingless; lvs. crowded, linear or filiform, fascicled; sc. subulate. ② Fields, Ga. to La. 1–2f. Rays spread 10″.

4 **H. quadridentàtum** Lab. Much branched, strongly winged; lvs. oblong, some lobed or toothed; disk oblong, longer than the rays. Swamps, S-W. 1–3f. June–Aug.

5 **H. Brachýpoda.** St. strongly winged, branches few, corymbous, 1-headed; hds. small (4″), rays 8–12, short (3–4″); disk brown-purp., globular. Damp, Ill. to Ga. 1–2f.

6 **H. Leptópoda.** Smooth; st. simple, clustered, naked above; lvs. lanceolate to oblong-linear, some decurrent; rays 20—30, spreading 1½′; disk convex. Moist soils, S. Car. to Fla. 2f. March, April.

7 **H. incìsum.** Smooth; lvs. lanceolate, sessile, not decurrent, sinuate-pinnatifid or incised; rays about 40, in 2 or 3 rows; fruit glabrous. Low barrens, Ga., and W. 2f.

8 **H. pubérulum.** Downy; sts. much clustered; lvs. lance-linear, sessile, not decurrent; rays 20–30, broad, spreading 1½–2′; fr. hairy. Wet pine-barrens, S. 2f. Ap.,May.

9 **H. brevifòlium.** Pubescent above, single, often some branched; lvs. lance-obl. to linear, obtuse, the radical spatulate, cauline subdecurrent. Wet. S. 2f. May, June.

10 **H. fimbriàtum.** Smooth; often branched; leaves lance-linear, subentire, acute, decurrent; pap. scales deeply cleft into a fringe of bristles. Barrens, Fla. 1–2f. Apr.+

68. BALDWÍNIA, N. Invol. scales closely imbricated in 2—4 rows. Recep. convex, deeply honeycombed, with horny walls. Rays 8—20, neutral, in 1 row, 3-toothed. Disk ☿. Cypsela silky-villous, immersed in the cells. Pappus of 9—12 oblong scales. ♃ Simple or corymbed. Leaves alternate, linear, punctate. Heads yellow. July—Sept.

1 **B. uniflòra** N. St. simple, puberulent, with 1 large head; rays about 20; lvs. below linear-spatulate; pap. scales 9. Swamps, Va. and S. 1—2f. Rays spreading 2′.

2 **B. multiflòra** N. Glabrous, corymbously branched; rays about 10; lvs. crowded, narrow-linear; fruit truncate and ray-marked at summit, crowned with 12 obovate scales. Sand hills, Ga. Fla. 1—3f. Rays 1½′. (Actinospermum, T. & G.)

69. MARSHÁLLIA, Schreb. FALSE SCABISH. Invol. scales lance-linear, subequal, erect, in 1 or 2 rows. Recep. convex, with linear, rigid pales. Fls. all tubular, ☿. Cor. lobes slender, spreading. Cyp. 5-angled. Pappus of 5 or 6 membranous, awned scales. ♃ Simple or branched, with alternate, entire, 3-veined leaves, and solitary, long-stalked heads of purplish flowers, resembling a Scabish. Ornamental.

1 **M. latifòlia** Ph. St. simple, leafy; lvs. ovate-lanceolate, acuminate, sessile; scales

rigid, acute; pales narrowly linear; pappus triangular-acuminate. Dry soils, Va. to Ala. 1f. Stem purple, smooth. Corollas 6—7″, slender. May, June.

2 **M. lanceolàta** Ph. Stem simple, leafy below; leaves oblanceolate to lanceolate, mostly obtuse and petiolate; scales obtuse. Uplands, S. 1—2f. April—June.

3 **M. angustifòlia** Ph. Mostly branching, leafy; lvs. narrow-lanceolate to linear, all acute; scales acute. Swamps, S. 1f. Very handsome. July, Aug.

70. ANTHÈMIS, L. CHAMOMILE, &c. Invol. hemispherical, with subequal, small imbricated scales. Rays numerous, generally ☿. Recep. chaffy (at least at summit), convex or conical. Disk-flowers ☿. Cypsela ribbed, smooth, linear or clavate. Pappus a slight border, or 0.—Herbs with 1-3-pinnatifid leaves, usually strong-scented. (Rays white.)

§ CHAMÆMELUM. Rays pistillate. Cyp. teretish. Lvs. mostly alternate....Nos. 1, 2

§ MARÙTA. Rays neutral. Cypselæ clubshaped or obovoid. Lvs. alternate....No. 3

1 **A. arvénsis** L. *Corn C.* St. erect, bushy, whitish-downy; lvs. bipinnatifid, segm. lance-lin.; branches naked above, 1-headed; pales cuspidate, longer than the flowers. ① Fields: not common. Resembles Mayweed, but inodorous. 8—15′. § Eur. July.

2 **A. nóbilis** L. *Garden C.* St. prostrate, branched from base, woolly; lvs. hairy, decompound-pinnatifid, seg. lin.-subulate; pales some shorter than the fls. ♃ Gardens, rarely in fields. Aromatic. § Eur.—Var. with fls. double (florets all radiate). Jl.-Sept.

3 **A. Cótula** L. *Mayweed.* Nearly smooth, erect, bushy; lvs. bipinnatifid, seg. linear-subulate; pales bristly, shorter than the flowers. ① Waysides: com. 1f. Hds. terminal, corymbed, disk yellow, rays white, showy. Ill-scented. Jn.-Sept. (Maruta, DC.)

71. ACHILLÆ̀A, L. MILLFOIL. YARROW. Invol. ovoid, of unequal, imbricated scales. Rays 5—10, short, ♀. Recep. flat, chaffy. Cyp. without a pappus. ♃ Leaves much divided, alternate. Heads small, corymbous.

1 **A. Millefòlium** L. Lvs. bipinnatifid, with linear, dentate, mucronate segments; stem furrowed, corymbed at top; sc. oblong, rays 4—5, short. Fields, waste grounds, everywhere. 1—2f. June—Sept.—A variety with rose-purple flowers, is very pretty.

2 **A. ptármica** L. *Sneezewort.* Leaves linear, acuminate, sharply serrate, smooth; hds. loosely corymbed; rays 8—12, longer than invol. (double in cult.) Rare. 15′. §

72. LEUCÁNTHEMUM, Tourn. WHITEWEED. Invol. broad, depressed, imbricated. Rays ♀, numerous. Recep. flat, naked. Cyp. striate, without pappus. ♃ Lvs. alternate. Hds. solitary, disk yellow, rays white.

1 **L. vulgàre** Lam. St. simple or branched; cauline lvs. clasping, few, lance-oblong, obtuse, cut-pinnatifid at base; scales brown at the edge. Too common in our fields and pastures. 2f. Rays spreading 1½′. July—Sept. § Europe. [N. Y. (Gerard.)

β. ***tubulifórme*** (Tenney). Ray-fls. tubular, very slender, 5-3-lobed. Po'keepsie,

2 **L. Parthènium** Godron. *Feverfew.* Branched; lvs. petiolate, 2-3-pinnate, segm. ovate, cut; hds. corymbed. Gardens, rarely in fields. 2f. Often double. (Matricaria, C-B.)

73. MATRICÀRIA, Tourn. MOTHER-CAREY. Invol. scales imbricated, with scarious margins. Recep. conical or convex, naked. Rays ♀ or 0. Pap. a membranous border on the cyp., or 0.—Herbs with alternate leaves.

1 **M. discoìdea** DC. Hds. discoid, few, terminal; lvs. sessile, 2-3-pinnately-parted, lobes small, linear-oblong, acute; sc. oval, obtuse, white-edged, much shorter than the conical disk. Ill. and W. Common in Cal. 3-8′. Disk 3″ broad and high. Jl.—Sept.

2 **M.** TANACÈTUM. *English Mint.* Downy; leaves oval, serrate, lower petiolate; heads small, corymbed, discoid. Europe. 1—2f. Aromatic. Jl. Aug. (M. Balsamitæ C-B.)

74. TANACÈTUM, L. TANSY. Invol. hemispherical, imbricate, the scales all minute. Recep. convex, naked. Pap. a slight membranous border. Cyp. with a large, epigynous disk.—Lvs. alternate, much dissected. Flowers yellow, discoid.

1 **T. vulgàre** L. Lvs. pinnatifid, segm. oblong-lanceolate, pinnatifid and cut-serrate; hds. fastigiate-corymbous, ray-fls. terete, tubular, 3-toothed. ♃ Waysides. 2-3f. Aug.

2 **T. Huronénse** Nutt. Lvs. bipinnatifid, lobes oblong, often again pinnatifid; heads large, corymbed; ray-fls. flattened, unequally 3-5-cleft. ♃ Sandy shores, W. 2—3f.

75. CHRYSÁNTHEMUM, L. Invol. bell-shaped, sc. imbricated, scarious at the edges. Recep. flat or convex, naked in the disk. Rays ♀, disk-fls. ☿, 5-toothed. Cyp. angular or compressed. Pap. 0 or tooth-like.—Plants ornamental, from E. Asia, with alternate, lobed lvs. and large rays. Fig. 387.

§ Pyrèthrum. Cypselæ wingless, angular, all alike. Plants perennial.....Nos. 1—3
§ Chrysánthemum. Cyp. of the ray 3-angled, of the disk compressed. ①.....Nos. 4, 5

1 **C.** Sinénse. Shrubby; lvs. sinuate-pinnatifid, thick, glaucous; rays much longer than the obtuse scales. Beautiful flowers of all colors, late in Autumn. 2—3f.

2 **C.** Indicum. Shrubby; leaves incisely-pinnatifid, thin, flaccid; rays little longer than the obtuse scales, spreading about 1′. Heads much smaller than in No. 1.

3 **C.** ròseum. Perennial, glabrous; lvs. 2-3-pinnatisect; hds. solitary, terminal; scales brown-edged; rays rose-colored or white, often double. ♃ Heads 1′ broad.

4 **C.** coronàrium. Annual; lvs. clasping, bipinnatifid, lobes dilated at summit; flowers large, terminal, yellow; pappus none. S. Europe. 3f. Varieties double, &c. Aug.

5 **C.** carinàtum. *Tricolored C.* Annual; lvs. thick, bipinnatifid; scales carinate; rays white, yellow at base, disk purple. Barbary. 1—2f. Flowers all Summer.

76. ARTEMÍSIA, L. Wormwood, &c. Invol. ovoid, imbricate, with dry, connivent scales. Recep. without pales. Disk-fls. numerous, ☿, tubular; ray-fls. few, often without stamens and with a subulate corolla or none. Cypsela with a small disk. Pappus 0.—Bitter herbs. Leaves alternate. Heads yellow or purplish, discoid. Aug., Sept.

§ Absínthium. Recep. villous or hairy. Fls. all fertile, heterogamous......Nos. 1, 2
§ Abrótanum. Recep. naked. Fls. all fertile.—*a* Lvs. or segm. lanceolate..Nos. 3, 4
—*a* Lvs. or segm. linear......Nos. 5—7
§ Dracúnculus. Recep. naked. Disk-fls. sterile.—*b* Lvs. trifid or entire...Nos. 8, 9
—*b* Lvs. pinnatisect....Nos. 10—12

1 **A. Absínthium** L. *Common W.* Leaves multifid, clothed with short silky down both sides; seg. lanceolate; hds. hemispherical, drooping. Waysides, N. 1-2f. § Eur.

2 **A. frígida** Willd. Lvs. silky canescent, the cauline pinnatifid; seg. linear, 3-5-cleft; hds. small, glob., drooping; inner sc. woolly. Rocky hills, Minn. Dak., and W. 6-12′.

3 **A. Ludoviciàna** N. Canescent-tomentous; leaves lanceolate, the lower serrate or pinnatifid, upper entire; heads ovoid, in a slender, leafy panicle. ♃ Shores, Mich. and W. 2—5f. Heads small and crowded.

4 **A. vulgàris** L. *Mugwort.* Lvs. canescent-tomentous beneath, pinnatifid with lanceolate segments, upper entire; heads erect, ovoid, subsessile, in a branched panicle. Waysides, N. and W. 3f. § Europe.

5 **A.** Abrótanum. *Southernwood.* Hoary; leaves bipinnatisect; heads hemispherical, nodding, downy. From S. Europe. 3f.

6 **A.** Póntica. *Roman W.* Lvs. hoary beneath, 2-3-pinnatisect; heads globular, nodding. Eur. 3f.

7 **A. biénnis** Willd. Erect, glabrous, simple; lvs. 1-2-pinnatifid, lobes sharply serrate or cut, those above subentire; hds. globular, erect, spicate, in a virgate, leafy panicle. ② Common westward, migrating E. to Po'keepsie (Gerard), and to Pa. 1-3f. Aug.+.

8 **A. Dracúnculus.** *Tarragon.* Glabrous; lvs. lin.-lanceolate, lower trifid; heads globous. From Siberia. 3f. A garden salad. Give a rich fragrance to vinegar.

9 **A. dracunculoìdes** Ph. Canescent when young, branched; lvs. lin.-filiform, the radical often trifid; hds. small, globular; inner scales roundish, outer oblong. ♃ N-W.

10 **A. boreàlis** Pal. Tufted, silky-villous, simple; lower lvs. petiolate, lance-linear, entire at base, ternately, pinnately, or bipinnately parted at apex with lin. lobes; hds. hemispherical; scales colored. ♃ Shores of Lake Superior, N. and W. 6–12′.

11 **A. Canadénsis** Mx. *Sea W.* Glabrous (mostly); lvs. 1-2-pinnatisect with linear seg.; hds. roundish, sessile, in a pan. of glomerules. ♃ Lake shores, N. 2–4f. Hds. 1″.

12 **A. caudàta** Mx. Glabrous, simple, densely paniculate; lvs. 3-2-1-pinnatisect with alternate, filiform segm.; heads globous, pedicellate, erect. ② Coast, N. H. to Ga. 4f.

77. SOLÌVA, R. & P. Invol. of 5—15 scales in 1 row. Recep. flat, naked. Fertile fls. in several rows, apetalous; ♀ fls. few, interior, with a 3–5-toothed corolla. Cyp. obcompressed, tipped with the persistent style and no pappus.—Little matted herbs with pinnatifid lvs. and sessile heads.

S. nasturtiifòlia DC. Lf. lobes 5—9, oblong, obtuse; sc. 10—15; fr. obconic, rugous, crowned with a dense tuft of wool instead of a pappus. Sandy shores, S. 1—3′.

78. GNAPHÀLIUM, L. CUDWEED. EVERLASTING. Heads discoid, heterogamous. Invol. imbricate with scarious, colored scales. Marginal fls. ♀, subulate, mostly in several rows; central fls. ☿. Recep. flat, naked. Pappus a single row of scabrous, hair-like bristles.—Herbs generally clothed with whitish wool. Leaves alternate, entire.

* Heads in terminal corymbous clusters. August. . ...Nos. 1—3
* Heads in axillary, somewhat spicate clusters...............................Nos. 4, 5

1 **G. decúrrens** Ives. Lvs. decurrent, linear-lanceolate, very acute, naked above, white and woolly beneath; fls. in dense, roundish, terminal clusters. ♃ Hilly pastures, N. Eng. to Penn. and Mich. 2f. Lvs. green above. Fls. yellow, scales white.

2 **G. polycéphalum** Mx. Woolly; lvs. sessile, linear-lanceolate, acute, scabrous above; hds. capitate, corymbous; sc. ovate-lanceolate, acute. ① Dry. 1–2f. Fragrant.

3 **G. uliginòsum** L. *Cudweed.* St. diffusely branched, woolly; lvs. sessile, linear-lanceolate; hds. small (1″ wide), in terminal, crowded, leafy clusters; scales obtuse, yellowish or brownish; fruit smooth. ① Moist hollows, N. M. W. 4–6′.

4 **G. purpùreum** L. Erect; lvs. linear- or obovate-spatulate, canescent beneath, green above; hds. sessile, crowded; sc. acuminate, purplish. ① Dry fields. 8—12′. June.

5 **G. supìnum** Villars. Cæspitous, woolly; lvs. linear; hds. few, oblong, in a spicate raceme or solitary; scales acute, brown. White Mountains. 2—4′. Rare.

6 **G.** FŒTIDUM, from S. Africa, has yellow heads, entire, clasping leaves. 2f. Hardy.

79. ANTENNÀRIA, Br. EVERLASTING. Heads ♀ ♂. Invol. of imbricate, colored scales. ♀ Cor. filiform. Recep. subconvex, alveolate. Pap. a single row of bristles. ♃ Tomentous. Lvs. alternate, entire. Hds. corymbous, with white or brownish, never yellow scales.

1 **A. margaritàcea** Br. Woolly-white, erect, corymbed above; lvs. lin.-lanceolate, 3-veined; scales elliptic, obtuse, pearl-white, fadeless. Fields. 1—2f. July.

2 **A. plantaginifòlia** Br. *Mouse-ear E.* Simple, with running stolons; leaves oval to spatulate, the cauline small, bract-like; hds. in a close terminal cluster, purplish, all ♀ in some plants, all ♂ in others, in early Spring. Borders of woods. . 5—8′.

80. FILÀGO, Tourn. COTTON ROSE. Heads heterogamous. Recep. columnar, naked at top, chaffy below, with pales resembling the scales, each with a ♀ fl. in its axil. Cyp. terete, the central with a hairy pappus. —Herbs canescent-downy. July, Aug. §.

F. Germánica L. Lvs. erect, crowded, linear-lanceolate; hds. in capitate clusters, which are successively proliferous; scales cuspid., straw-color. ① Fields, E. 6—10′.

81. AMMÒBIUM, Br. Invol. imbricated, sc. with broad, scarious, spreading tips. Recep. broad-conic, chaffy. Fls. all tubular, ☿. Cyp. 4-angled, 4-toothed. ♃ Australia. Stems winged with the decurrent leaves.

A. ALÀTUM. ① In gardens. 1—2f. Villous-canescent. Root lvs. oblong-petioled. Involucre white, flowers yellow. Summer.

82. RHODÁNTHE, Lindl. Involucre top-shaped, imbricate, sc. dry, ovate, acute, the inner radiate-spreading. Recep. naked. Fls. all tubular, 5-toothed, ☿. Cyp. woolly. Pap. of plumous bristles. ① Australia.

R. MANGLÉSII. Lvs. oblong, clasping, entire; hds. large, fadeless, rose-colored, variegated. A splendid "Everlasting," with many beautiful varieties. Hds. 1—2′ diam.

83. HELICHRỲSUM, Cass. IMMORTAL FLOWER. Invol. imbricate, with scarious, colored scales. Recep. flat, naked of pales. Pap. a row of bristles, often cohering.—Herbs or shrubs, chiefly S. African. Lvs. alternate. A vast genus of 200 species.

1 **H.** BRACTEÀTUM. Branching, puberulent; lvs. lanceolate to linear, repand, acuminate; hds. terminal, bracted at base; outer scales brownish, the inner radiant, ylw. to wh.

2 **H.** MACRÁNTHUM. Subsimple, scabrous; lvs. spatulate to lance-oblong, obtuse, entire; hd. 1 or few, large, white outside, roseate within; inner scales radiant. ①—♃.

β. COMPÓSITUM. Hds. composite (or double), purple, carmine, yellow, white.

γ. ATROSANGUÍNEUM. Hds. composite, with deep crimson scales and pappus. 18′.

84. XERÁNTHEMUM, Tourn. Hds. discoid, heterogamous. Invol. hemispherical, imbricated, dry, with radiant, colored scales. Recep. with 3-toothed, dry pales. Pap. chaffy-bristly. ① S. Eur. Lvs. entire. Hds. white or rose-colored.

X. RADIÀTUM. *Eternal Flower.* Erect, branched. Lvs. linear-oblong; hds. 1—2′ diam.

85. ERÉCHTITES, Raf. FIRE-WEED. Fls. all tubular, those of the margin ♀, of the disk ☿. Invol. cylindrical, simple, slightly calyculate. Recep. naked. Pap. of numerous, fine, capillary bristles. ① Lvs. simple, alternate. Fls. corymbous, whitish. A rank weed.

E. hieracifòlius Raf. St. virgate, paniculate; lvs. oblong, acute, clasping, unequally and deeply cut-toothed; invol. smooth; fr. hairy. Burnt grounds, &c. 3f. Aug.+.

86. CACÀLIA, L. TASSEL-FLOWER. Fls. all tubular, ☿. Involucre cylindric, oblong, in one series, often calyculate with small scales at the base. Recep. not chaffy. Pap. capillary, scabrous. ①♃. Smooth. Lvs. alternate. Heads of flowers corymbed, mostly cyanic.

§ Scales of the invol. cohering, about 12. Flowers 60—80, scarlet................No. 8
§ Scales of the invol. distinct,—*a* about 12. Flowers 20—30, white..................No. 1
—*a* 5 only. Fls. 5.—*b* Lvs. cordate or lobed....Nos. 2—4
—*b* Lvs. never cordate.......Nos. 5—7

1 **C. suavèolens** L. Glabrous; st. striate-angular; lvs. on winged petioles, hastate-sagittate, dentate, green on both sides; fls. white. ♃ Ct., W. and S.: rare. 4—5f. Aug.

2 **C. renifórmis** Muhl. St. sulcate-angled; lvs. palmately-veined, nearly smooth, green, petiolate, lower reniform, upper flabelliform. ♃ Woods, Ill. to Car. 3—6f. Jl.

3 **C. atriplicifòlia** L. St. terete; lvs. petiolate, smooth, glaucous beneath, palmate-veined, angularly-lobed and dentate, the lower subcordate. N. Y., S. and W. 3-5f. Jl.

4 **C. diversifòlia** T. & G. Not glaucous; st. striate-angled; lower lvs. cordate-ovate, obtuse, repand-dentate, upper 3-5-lobed, subhastate. ♃ Swamps, Fla. 2—3f. May+.

5 **C. tuberòsa** N. St. angular-sulcate; lvs. oval or ovate, strongly 5-7-veined, not glaucous, petiolate, lower petioles very long. ♃ Swamps, W. and S. 2—5f. May—Jl.

6 **C. ovàta** Ell. St. terete; lvs. glaucous beneath, 3-5-veined, ovate and oval, entire or undulate-margined, contracted at base into petioles. ♃ Swamps, S. 3—4f. July+.

7 **C. lanceolàta** N. St. terete; lvs. 3-veined, glaucous beneath, lanceolate to lance-linear, the lower tapering to petioles, upper sessile; corymb simple. ♃ Ga. Fla. 5f.

8 **C.** COCCÍNEA. *Tassel-flower.* Root leaves ovate-spatulate, cauline clasping-auriculate; invol. much shorter than the scarlet fls., finally reflexed. E. Ind. 1—2f. June—Sept.

87. **SENÈCIO,** L. GROUNDSEL. Invol. of many equal scales, or invested with a few shorter ones at base. Fls. all tubular, ☿, or usually radiate and rays ♀. Recep. not chaffy. Pap. simple, capillary and copious. —A vast genus of herbs and shrubs. Lvs. alternate. Fls. mostly yellow, exceeding the invol. Fig. 160.

§ Rays none. Root annual. (A perennial climber, No. 11.)......................No. 1
§ Rays yellow.—*a* Radical leaves undivided. Achenia glabrous.............Nos. 2, 3
—*a* Radical leaves undivided. Achenia pubescent............Nos. 4, 5
—*a* Radical leaves divided, as well as the cauline...............Nos. 6, 7
§ Rays purple, &c. Species of Cineraria, L. &c. in the greenhouse.........Nos. 8—10

1 **S. vulgàris** L. St. paniculate, erect, angular; lvs. sinuate-pinnatifid, dentate, amplexicaul. ① A weed in gardens, &c. 1f. 18′. Flowers all Summer.

2 **S. aùreus** L. Radical lvs. ovate, cordate, crenate-serrate, petiolate, cauline ones lyrate-pinnatifid, dentate, terminal segments lanceolate; ped. subumbellate, thick; rays 8—12; fr. glabrous. ♃ Woods, meadows. 1—2f. Rays spread 1′. May—Aug.
β. ***Balsámitæ.*** Pubescent; lvs. few, small, the radical lance-oblong. Rocks.
γ. ***grácilis.*** Root lvs. roundish, on long petioles, cauline linear-oblong, dentate.
δ. ***obovàtus.*** Root leaves obovate to oblong-spatulate; peduncles long.
ε. ***lanceolàtus.*** Lvs. lanceolate, the cauline pinnatifid at base. Vt. Rare.
ζ. ***discoidea*** (Porter). Rays none; lvs. obov.-spatulate, cauline pinnatifid. Penn.

3 **S. obovàtus** Ell. Tomentous, becoming glabrous; root lvs. obovate or roundish, crenate, with an attenuated, sessile base; cauline few, small, cut-pinnate; corymb small, rays 10—12, spreading 1′. ♃ Va. to Fla. 1f. Stem nearly leafless. May.

4 **S. tomentòsus** Mx. Cottony-tomentous; st. lvs. obovate to oblanceolate, obtuse, long-petioled, crenate, upper sessile or none; rays 12—15, spreading 16″. ♃ Va. & S.

5 **S. anónymus** Wood. Cottony-tomentous; root lvs. oblong, obtuse, crenately toothed or lobed, cauline pinnatifid, the lobes dentate; hds. small, rays 6—9, spreading 6″. ♃ Thickets, Ala. (Montgomery). 2f. Corymbs compound. May, June.

6 **S. Canadénsis** L. Lvs. glabrous, bipinnatifid; seg. lobed, obtuse, the few upper pinnatifid; corymbs compound; rays 9—12. ♃ Canada (Kalm), Mts. N. Car.

7 **S. lobàtus** Pers. *Butterweed.* Glabrous; leaves all pinnatifid, the lower lyrately, lobes crenate; invol. subcalyculate; rays 10—12. ① Wet. S.: com. 2—3f. Mar. Apr.

8 **S.** ÉLEGANS. *Purple Jacobæa.* Lvs. pinnatifid, hairy, viscid; scales scarious at tip, calyculate with an outer row of short green ones. ① S. Afr. Purp., varying to white.

9 **S.** LANÀTA. Lvs. roundish, angular, cordate, woolly beneath; rays vivid purple outside, wh. within; disk white or blue. ♃ Canaries. 3f. Shrubby.—Many varieties.

10 S. CRUÉNTUS. Lvs. angular, cordate, cut-toothed, purple beneath, the petioles winged, ear-shaped at the base; heads in a broad corymb, crimson, purple, blue, white. ♃ Canaries. A common handsome greenhouse plant.

11 S. SCANDENS. *German Ivy.* Climbing and twining; leaves smooth, roundish-cordate, 5–7 angled or lobed; corymbs axillary, of small rayless yellow heads. ♃ S. Africa. Blooms freely in California, rarely in our greenhouses.

88. **ÁRNICA**, L. Involucre of equal, lanceolate scales, 1- or 2-rowed. Ray fls. ♀, disk ☿. Receptacle flat, with scattered hairs. Pap. single, rigid, and serrulate. ♃ Stem simple. Leaves opposite. Flowers yellow.

1 A. mollis Hook. Pubescent; stem leafy; lvs. becoming nearly glabrous, dentate, lance-oblong, radical ones petiolate; hds. few; fr. hairy. Mts. &c. N. H., N. Y. July.

2 A. nudicaùlis Ell. Hairy; st. nearly naked; lvs. all sessile, ovate, subentire, the cauline bract-like; heads large, rays 12, spreading 2′; fruit glabrous. Wet sands, Va. to Fla. 1f. April, May.

89. **RUGÈLIA,** Shutt. Invol. as in Arnica. Fls. all tubular, ☿. Recep. convex, naked. Cyp. terete, striate. Pap. of rough bristles. ♃ Lvs. alternate. Heads large.

R. nudicaùlis Shutt. St. simple, erect; branches 1-flwd.; root lvs. ample, ovate, narrowed to long winged petioles; stem lvs. small, subsessile. Mts., Tenn. 1f.

90. **CÝNARA,** L. Heads discoid, homogamous. Invol. dilated, imbricate, scales fleshy, emarginate, pointed. Receptacle fibrillate. Pap. plumous. Cypselæ not beaked. ♃ Spiny. Leaves not decurrent.

1 C. SCÓLYMUS. *Garden Artichoke.* Leaves subspinous, pinnate, and undivided; invol. scales ovate. Gardens. The heads are used as asparagus. Coarse plants.

2 C. CARDÚNCULUS. *Cardoon.* Leaves spiny, all pinnatifid; invol. scales ovate. S. Eur. The petioles, blanched by culture, are used as celery.

91. **TAGÈTES,** L. MARIGOLD. Heads heterogamous. Invol. simple, tubular, of 5—10 united scales. Ray-fls. 5, persistent. Receptácle naked. Pap. of 5 erect awns. ① Tropical America. Leaves pinnately divided.

1 T. PÁTULA. *French Marigold.* Stem erect, with widely-spreading, 1-headed branches; lf. segm. linear-lanceolate; ped. long; invol. terete. Yel. and dark purp. Handsome.

2 T. ERÉCTA. *African Marigold.* Stem stout, erect; lf. segm. lanceolate; ped. 1-flwd., thickened at top; involucre angular. Yellow and orange.

3 T. FLÓRIDA. Erect, corymbously branched; lvs. lanceolate, opposite, aristate-serrate: rays mostly 3, large, yellow. Mexico. 18′.

92. **CALÉNDULA,** L. POT MARIGOLD. Heads radiate. Invol. of many equal leaves, in about 2 series. Rays ♀, disk ♂. Receptacle naked. Cyp. of the disk membranaceous. Pap. 0. ① Oriental. Lvs. alternate.

C. OFFICINÀLIS. Viscid-pubescent; stem branched; lvs. oblong, acute, mucronate, sessile; hds. terminal, solitary; large, brilliant, orange, lemon, double, &c. June—Sep.

93. **CENTAÙREA,** L. KNAP-WEED. BACHELOR'S-BUTTON. Hds. discoid. Invol. imbricate. Fls. all tubular, the marginal often enlarged, ray-like, neutral. Pappus filiform, scale-form, or 0. ①♃ Lvs. alternate.

* Scales of the involucre with a fringed or pectinate appendage.............Nos. 1, 2
* Scales not appendaged,—*a* merely ciliate or spinescent......................Nos. 3. 4
—*a* nor ciliate nor spinescent (Amberboa).........Nos. 5. 6

1 **C. Americàna** N. Erect, sparingly branched; leaves sessile, glabrous, repand-toothed, ovate-oblong to lanceolate; hds. few, very large, with the marginal fls. much enlarged, pale-purple. ① Ark. La. and § in Ill. 2—4f. Appendages straw-yellow.

2 **C. nigra** L. Erect, branched, pubescent; lvs. angular-lyrate to lanceolate, dentate; sc. ovate; marg. fls. not enlarged, all purp. ♃ Fields. Append. dark brown. § Eur.

3 **C. Cýanus** L. *Bachelor's-button.* Erect, branched, downy; lvs. linear; sc. ciliate-serrate; outer fls. much enlarged. ① Fields, gardens. Purple, blue, white.

4 **C. Calcitrapa** L. *Star Thistle.* Hairy, diffusely branched; lvs. pinnately lobed, lobes lin.; scales tipped with spreading spines. ② Pa. to N. Car. Purple. § Eur.

5 **C.** MOSCHÀTA. Lvs. lyrate, dentate; invol. subglobous, smooth; sc. ovate; ray-fls. scarcely enlarged; pap. 0. ① Persia. Purple, varying to white. July—October.

6 **C.** SUAVÈOLENS. *Yellow Sweet Sultan.* Lvs. oblong, toothed, the upper pinnatifid at base; ray fls. much enlarged, yellow; pap. chaff-like. ① Levant. 1—2f. July—Sept.

94. **CÁRTHAMUS,** L. Saffron. Hds. discoid. Invol. imbricated, outer bracts foliaceous. Fls. all tubular and ☿, filaments smooth. Pap. 0. Receptacle with setaceous pales. Cypselæ 4-angled.—Oriental herbs.

C. TINCTÒRIUS. St. smooth; leaves ovate-lanceolate, sessile, spinous-denticulate, half-clasping. ① Egypt. Heads large, with long, slender, orange-colored flowers. July.

95. **CNÌCUS,** Vaill. Blessed Thistle. Heads discoid. Invol. ventricous, imbricate with doubly spinous scales. Ray-fls. sterile. Receptacle very hairy. Pappus in 3 series, the outer 10-toothed, the 2 inner each 10-bristled.—Oriental herbs.

C. benedíctus L. Lvs. somewhat decurrent; dentate and spiny; invol. doubly spinous, woolly, bracteate. Fields, &c.: rare. 2f. Heads large, yellow. §

96. **ONOPÓRDON,** Vaill. Cotton Thistle. Heads discoid, homogamous. Involucre ventricous, imbricate with spreading, spinous scales. Recep. deeply alveolate. Pappus copious, capillary, scabrous. Cypselæ 4-angled.—Large, branching herbs, with decurrent leaves.

O. acánthium L. Plant cottony-white; involucre scales spreading, subulate; leaves ovate-oblong, sinuate, spinous. ② Waste grounds: rare. 3f. Fls. purp. Jl., Aug.

97. **CÍRSIUM,** Tourn. Thistle. Hds. discoid, homogamous. Invol. subglobous, of many rows of spinous-pointed, imbricated scales. Recep. bristly. Style scarcely divided. Pap. copious, plumous. Cyp. compressed, smooth.—Herbs with alternate lvs., generally armed with spinous prickles. Flowers in Summer. Figs. 178, 345.

* Leaves decurrent on the stem more or less, floccous-woolly beneath.........Nos. 1, 2
* Leaves not decurrent,—*a* white-tomentous both sides. Plants low, stout...Nos. 3, 4
—*a* white-tomentous beneath only. Plants slender..Nos. 5—7
—*a* green both sides.—*b* Hds. leafy-bracted at base...Nos. 8, 9
—*b* Hds. naked, few, large (1′).Nos. 10, 11
—*b* Hds. naked, many, small.......No. 12

1 **C. lanceolàtum** Scop. *Common Thistle.* Lvs. decurrent, pinnatifid, hispid, the segments divaricate and spinous; hds. several, ovoid, villous; scales lanceolate, tipped with a spine, spreading. ② N. and M.: common. 3—4f. Heads purple.

2 **C. Lecóntii** T. & G. Slender, subsimple, with few hds.; lvs. lin.-lanceolate, more or less decurrent, hoary beneath, teeth few, spinous; scales not spinous, cuspidate; heads large (1′ diameter), purple. Swamps, Ga, Fla. to La. 2f.

3 **C. Pítcheri** T. & G. White-tomentous; lvs. pinnatifid, segm. linear, spinous, margins revolute; scales spine-pointed; flowers ochroleucous. ♃ Lake shores, W. June, July.

4 **C. undulàtum** Spr. White-tomentous; lvs. lance-oblong, sinuate-pinnatifid, wavy, prickly; scales scarcely prickly; flowers purple. ② Mich., and N. 1—2f.

5 **C. díscolor** Spr. Slender, much branched; lvs. pinnatifid, segm. 2-lobed, divaricate, spinous; scales ovate, tipped with a spreading spine. ② N. 3—5f. July+.

6 **C. altíssimum** Spr. Tall, branching, villous, leafy to the top; lvs. lance-oblong, often sinuate-dentate, or pinnatifid, spinescent; scales lance-ovate, the outer with a spreading spine. Fields, M. and W. 3—8f. Purple. August.

7 **C. Virginiànum** Mx. Slender, subsimple, naked above; lvs. lanceolate, margins revolute, spinescent, lobed or dentate, white-downy beneath; heads small (6″); scales bristle-tipped. Woods, W. and S. 3—4f. Purple. April—Sept.

8 **C. horrídulum** Mx. Cottony when young; leaves cut-pinnatifid, spinous; heads large, invested by a whorl of very spiny bracts; scales sharp-pointed. ② Uplands, N. Eng. to Fla. Flowers purple or cream-color. 1—3f. April—August.

9 **C. pùmilum** Spr. Hairy; lvs. few above, green, clasping, lance-oblong, pinnatifid, segm. lobed, spinous; heads few, very large, subtended by 1—5 bracts; invol. round-ovate, spinous. ② Pastures, waysides, N. Eng. to Pa., and W.: com. 1—2f, stout. Flowers purple, fragrant. July, August.

10 **C. mùticum** Mx. Lvs. pinnatifid; heads on naked peduncles, bractless; invol. unarmed, with webbed and glutinous scales. ② Damp. 3—7f. Hds. 1′. Aug., Sept.

β. ***glabrum.*** Nearly glabrous; lvs. lance-lin., lobed; scales with minute spines. S.

11 **C. repándum** Mx. Lvs. crowded to top, at length green both sides, clasping, lin.-oblong, wavy, spinous-ciliate; hds. 1 or 2; inner scales subulate. Barrens, S. 1—2f.

12 **C. arvénse** Scop. *Canada Thistle.* Lvs. sinuate-pinnatifid, wavy, lance-oblong; hds. panicled, small (5″), numerous; scales with minute prickles. ♃ Waysides, fields, N. and W. A pernicious weed, hard to extirpate. 3f. Very prickly, except its heads.

13 **C.** PULCHÍRRIMUM, with yellow flowers, 3f high, is rarely planted in borders.

14 **C.** ÍANTHIUM. A greenhouse shrub, covered with pale blue flowers. From Mexico.

98. **LÁPPA,** Tourn. BURDOCK. Heads discoid, homogamous. Invol. globous, the scales imbricated and hooked at the extremity. Recep. bristly. Pap. bristly, scabrous, caducous. ② European herbs. Lvs. alternate, large, cordate, petiolate. Hds. panicled, pink-purple, very adhesive by the hooks.

L. officinàlis Allioni.—A coarse weed, in waste and cultivated grounds, E. and W. 3f. (L. major Gært.)—Varies with small hds. and lvs. somewhat pinnatifid. (L. minor DC.)

99. **LAMPSÀNA,** Tourn. NIPPLEWORT. Hds. radiant, 8–12-flwd. Invol. cylindrical, angular. Scales 8, erect, in one row, with 2 or 3 minute bractlets at base. Recep. naked. Cyp. glabrous. Pap. 0.—Slender, oriental herbs, with small, yellow heads, in paniculate corymbs.

L. commùnis L. Stem leafy; lvs. ovate, petiolate, dentate; ped. cylindrical; invol. angular in fruit. ① Waysides, Quebec, Boston, and W. Rare.

100. **APÒGON,** Ell. Heads radiant. Invol. scales ovate, acuminate, about 8, in two rows. Recep. naked. Ach. glabrous, oval, longitudinally 12-striate. Pappus 0. ① Herbs glabrous and glaucous, branched from the base. Leaves alternate, lanceolate. Heads small, yellow.

A. hùmilis Ell.—Woods, S. Car. to Fla. and La. 3—12′. Slender, smooth; lvs. varying to linear, entire or lyrately lobed. Heads 3″ broad. March—June.

101. **CICHÒRIUM,** Tourn. CHICORY. Invol. double, the outer of 5

leafy scales, the inner of about 8 linear ones. Receptacle chaffy. Pappus scaly. Cypselæ not rostrate, obscurely 5-sided.—Oriental herbs with bright blue flowers, about 20 in a head.

1 **C. Intybus** L. Root lvs. runcinate, cauline bract-like; heads axillary, subsessile, mostly in pairs. ♃ Dooryards, waysides, E. 2—3f. Rays large, showy, 5-toothed. The root, or its extract, is often mixed with coffee. July—Sept. § Europe.

2 **C.** ENDÍVIA. *Endive.* Root leaves sinuate-dentate or pinnatifid, cauline auricled at base; heads axillary, 3—5 together. ① India. Cultivated as a salad.

102. **KRÍGIA,** Schreb. DWARF DANDELION. Involucre many-leaved, nearly simple, equal. Recep. naked. Cypselæ turbinate, striate, 5-angled. Pappus double, consisting of 5 broad, membranous scales, alternating with as many slender, scabrous bristles. ① Acaulescent, small. Leaves lyrately lobed. Scapes simple. Heads solitary, with 20—30 yellow flowers.

1 **K. Virgínica** Willd. Early lvs. round-spatulate, subentire, the later toothed and pinnatifid; scapes 1—5 or more, 1′—10′ high. Rocks and sands. Hds. 5—6″. May+.

2 **K. Caroliniàna** N. Early lvs. lin.-oblanceolate, few-toothed, later lvs. lyrate-pinnatifid, or angular-lobed; scapes 1—5 or more, 2′—12′. Sands. S. Feb.—May.

103. **CÝNTHIA,** Don. Invol. nearly simple, of equal, narrow scales. Recep. flat, alveolate. Pap. double, the outer minute, scaly, inner copious, capillary. Cyp. short. ♃ Lvs. alternate or all radical. Fls. 15—20, yellow.

1 **C. Virgínica** Don. St. few-leaved, subumbellate; lvs. lance-obl., repand-dentate, rarely lobed, petiolate. N. Y. to Ill., and S. Very smooth. 1—2f. Hds. 9″. June.

2 **C. Dandèlion** DC. Acaulescent; scapes leafless, simple, 1-flwd.; lvs. spatulate-obl. to lance-lin., entire or toothed, rarely pinnatifid. Md. to Ga. and Tex. 6—18′. Mar.–Jn.

104. **LEÓNTODON,** L. AUTUMN DANDELION. Invol. imbricate, the outer sc. very short. Recep. naked. Pap. plumous, persistent on the somewhat rostrate cypsela.—Acaulescent herbs with yellow fls., many in a head.

L. autumnàlis L. Scape branching; ped. scaly-bracted; lvs. lanceolate, dentate-pinnatifid, smoothish. Waysides, meadows, &c. E. N. Eng. 6′—20′. Hds. several, near 1′ in diameter. July—Oct. § Europe.

105. **TRAGOPÒGON,** L. VEGETABLE OYSTER. Invol. simple, of many leaves. Recep. naked. Pap. plumous. Cyp. longitudinally striate, contracted into a long, filiform beak. ② European, with long, grass-like lvs.

T. porrifòlius L. Invol. much longer than the corolla; lvs. lance-linear; ped. thickened upward; pappus tawny. Waysides, &c. N. Y. (Hankenson). 3f. June. § ‡

106. **HIERÀCIUM,** Tourn. HAWKWEED. Invol. more or less imbricated, ovoid, many-flwd. Sc. very unequal. Cyp. not rostrate. Pap. a single row of copious, tawny, fragile bristles. ♃ Lvs. alternate, entire or toothed.

* Heads 40–50-flwd. Invol. more or less imbricated. Cyp. blunt at top......Nos. 1, 2
* Heads 12–30-flwd. Involucre simple.—*a* Achenia contracted at the top....Nos. 3, 4
—*a* Achenia not contracted upward...Nos. 5, 6

1 **H. Canadénse** Mx. St. erect, subvillous, leafy, corymbed; lvs. sessile, ovate-obl. to lanceolate, acute, with few acute teeth; invol. strongly imbricated; fruit brown. Rocky woods, N. Eng. to Wis., and N. 1–2f. Stout. Hds. near 1′ broad. Aug., Sept.

2 **H. scàbrum** Mx. Leafy, rough-hirsute, glandular above; lvs. obovate to elliptic, subentire; invol. scarcely imbricated; fr. red. Hilly woods. 1—3f. Hds. 9″. Aug.

3 **H. longípilum** Torr. Clothed with *long*, erect, shaggy *hairs*; lvs. lance-oblong, entire; hds. glandular, 20-30-flwd. in a small naked panicle. W. 1—2f. July, Aug.

4 **H. Gronòvii** L. Hairy, paniculate, glandular at top; lvs. obovate to lance-oblong, slightly toothed, the cauline sessile, often few; fr. 20—30, *narrowed above.*—Varies with stems leafy or subnaked; pan. close or diffuse. Dry hills: com. 1—3f. Aug.+.

5 **H. venòsum** L. Scape or stem leafless, or with one leaf, paniculate, smooth; lvs. obovate, entire, nearly glabrous, with purple veins; scales smooth; fls. 20; *fr. linear.* Woods, E. and W. 1—2f. Hds. on slender ped., broader (9″) than in No. 4. Jl., Aug.

6 **H. paniculàtum** L. Slender, leafy, diffusely paniculate; lvs. lanceolate, glabrous; ped. very slender; fls. 10—20; fr. short-cylindric, black. Woods: com. 2—3f. Aug.

107. CATANÁNCHE, L. Invol. imbricated, scarious. Recep. paleaceous. Pap. paleaceous, 5-leaved. Pales awned. ① Oriental herbs, with alternate, lanceolate leaves.

C. CŒRÙLEA L. Lvs. villous, somewhat bipinnatifid at base; invol. lower scales ovate, mucronate. S. Europe. 2—3f. Heads on long peduncles. Blue. July+.

108. NÁBALUS, Cass. DROP FLOWER. Invol. cylindric, of many linear scales in one row, calyculate with a few short, appressed scales at base. Recep. naked. Pap. copious, capillary, brownish, 2-rowed, persistent. Cyp. not beaked, smooth, striate. ♃ Erect, with a tuberous, bitter root. Heads 5-18-flowered, not yellow, although often straw-colored.

§ Heads pendulous, glabrous. Leaves variously lobed or shaped...(*a*)
a Dwarf species (6—10′ high) native of high mountains..................Nos. 1, 2
a Tall (2—5f high).—*c* Heads 5-6-flowered...................................No. 3
—*c* Heads 8-12-flowered.—*d* Pappus tawny.............No. 4
—*d* Pappus straw-colored....Nos. 5, 6
§ Heads nodding or erect, hairy. Leaves mostly undivided...(*b*)
b Heads about 12-flowered. Pappus straw-color.......................Nos. 7, 8
b Heads about 25-flowered. Pappus tawny or dusky.......................No. 9

1 **N. Boottii** DC. St. simple, dwarf; lvs. hastate-cordate to lanceolate, mostly entire; heads racemed; flowers 10—18, inner scales 10—15. High mountains, N. July+.

2 **N. nanus** DC. Smooth, simple; lvs. deltoid-hastate and variously lobed, upper lanceolate, all petiolate; hds. clustered-paniculate; sc. 8, fls. 10—12. White Mts. Aug.

3 **N. altíssimus** Hook. Smooth, strict, paniculate, tall, leafy; lvs. petiolate, palmately 3-5-cleft, or lobed, varying to hastate, cordate, or even ovate, dentate; hds. 6″ long, yellowish, forming a slender, leafy panicle; sc. 5. Woods, N. 3—5f. August.

4 **N. albus** Hook. *Lion's-foot. White Lettuce.* Smooth, glaucous, corymb.-paniculate; lvs. hastate-lobed to ovate, petiolate, the lobes or leaves obtuse; heads 6—7″, with 8 scales, 9—12 fls., and brown pappus. Moist woods. 2—4f. Purplish in spots. Aug.

*β. **Serpentària.*** *Snake-root.* Lvs. deeply 3-lobed, the middle lobe 3-parted.

5 **N. Fràseri** DC. *Earth-gall.* Smoothish, corymb.-paniculate; lvs. hastate or deltoid, rarely 5-7-lobed, on winged stalks, upper lanceolate.—Varies with the leaves all lanceolate and merely toothed. Hard soils, Conn. to Fla. 2—4f. August.

6 **N. virgàtus** DC. Glaucous, simple, strict; lvs. sinuate-pinnatifid, narrow, the upper toothed or entire; panicle or raceme virgate. Sands, N. J. to Fla. 2—4f. Sept., Oct.

7 **N. racemòsus** Hook. Smooth (exc. the invol.), simple, slender; lvs. lance-oval to lance-ovate, denticulate; hds. suberect, spicate-paniculate. Swamps, N. J. to Iowa, and N. 2—4f. Flowers pale red.—Varies with the lower leaves cut-pinnatifid. Sept.

8 **N. asper** T. & G. Rough-downy, simple, strict; leaves oval-oblong to lance-oblong, dentate; hds. erect, fascicled in a spicate panicle; fls. yellowish. W. 2—4f. Sept.

9 **N. crepidíneus** DC. Smoothish, tall, stout, corymb.-paniculate; lvs. broadly triang.-ovate to lanceolate, toothed, petiolate; hds. nodding, of 12 sc. and 25—35 ochroleucous fls. Fields, thickets, W. States. 5—8f. Larger than any of the foregoing. Sept.

109. LYGODÉSMIA, Don. Invol. fls., &c., as in Nabalus. Pappus whitish. Corollas rose-colored. ♃ With linear-subulate leaves and erect heads on long, naked peduncles.

1 **L. aphýlla** DC. St. scape-like, erect, slender, forked above; lvs. nearly all radical, short, linear-filiform; heads 5-flowered. Pine woods, Ga. Fla. 2f. May.

2 **L. júncea** N. St. much branched; lvs. lance-linear; fls. 5. Min. (Matthews), and W.

110. TRÓXIMON, Nutt. Hds. many-flowered. Invol. campanulate, scales loosely imbricate, in 2—3 rows. Cyp. oblong-linear, compressed, glabrous, not rostrate. Pap. setaceous, copious, white. ♃ Lvs. all radical. Scape bearing a single, large, showy head, with yellow flowers.

T. cuspidàtum Ph. Rt. fusiform; lvs. linear-lanceolate, woolly at the edge; scales lanceolate, cuspidate-pointed. Prairies, Ill. Wis., and West. April—June.

111. PYRRHOPÁPPUS, DC. FALSE DANDELION. Invol. double, the outer row numerous, loose and spreading. Receptacle naked. Cyp. 5-grooved, at length long-beaked, bearing a copious, soft, capillary, reddish pap. ① ♃ Hds. solitary on long ped., large, with numerous deep yel. fls.

P. Caroliniànus DC. St. simple or branched, scape-like: lvs. mostly radical, lanceolate, acute, sinuate-toothed, lobed, or pinnatifid. Fields, Md. to Fla. May—July.

112. TARÁXACUM, Desf. DANDELION. Invol. double, the outer of small scales, much shorter than the inner appressed row. Recep. naked. Cyp. produced into a long beak crowned with the copious, white, capillary pappus.—Acaulescent herbs, with runcinate leaves. Figs. 68, 346, 492.

T. Dens-leònis Less. Outer scales of the involucre reflexed; lvs. runcinate, smooth, dentate; scape short in fl., long in fr.—a globe of pappus. ♃ Fields: common. § Eur.

113. LACTÙCA, Tourn. LETTUCE. Invol. few-flowered, scales imbricated in 2 or more unequal rows. Cyp. obcompressed (flattened same way as the scales), glabrous, abruptly narrowed to a long, filiform beak. Pappus copious, soft, capillary, white.—Herbs with leafy stems and paniculate heads of variable colors. Fig. 77.

1 **L. Canadénsis** L. *β. elongàta. Trumpet Milkweed.* St. tall, hollow; lvs. pale beneath, clasping, runc.-pinnatifid, upper lance., entire; heads racemous-paniculate, with few scales and 12+ fls. ② Rich soils, thickets. 3—6f. Yel. to purplish. Jl., Aug.

β. sanguinea. Stem, lf. veins, and fls. purple; lvs. some hairy, glaucous beneath.

γ. graminifòlia. Lvs. long, linear, the lower few-lobed, upper entire. South.

δ. integrifòlia. Lvs. lanceolate, all entire, lower some sagittate at base.

2 **L. satìva.** *Garden Lettuce.* Stem corymbous; lvs. roundish, the upper cordate; fls. white. ① Said to be § in some places, when its lvs. become dentate-lobed and prickly.

114. MULGÈDIUM, Cass. WILD LETTUCE. Involucre somewhat double, outer scales short and imbricated. Recep. naked, faveolate. Pap. capillary, crowning the short-beaked, *compressed* cypsela.—Leaves mostly spinulous. Hds. paniculate, small, ∞-flwd. Jl.—Sept. Figs. 76, 448–50.

* Pappus bright white. Corollas blue..Nos. 1, 2
* Pappus tawny. Corollas cream-colored, turning purplish.....................No. 3

1 **M. Floridànum** DC. Smooth; lvs. runcinately pinnate-parted, segm. few, sinuate-dentate or angular; pan. loose, hds. 9″. ② Thickets, N. Y., W. and S. 3—6f.
β. ***acuminàtum.*** Lvs. lance-ovate, acuminate, toothed, or the lower subruncinate.

2 **M. pulchéllum** N. Smooth and glaucous, strict; lvs. lance-oblong to lin., entire, or the lowest runcinate; pan. corymbed; fls. bright blue. L. Huron to Oreg. 2—7f.

3 **M. leucophæum** DC. Tall, leafy; lvs. lyrate-runcinate, coarsely-toothed; ped. scaly-bracted; pan. long, compound; fr. scarcely beaked. ② Moist thickets. 5—10f.

115. SÓNCHUS, L. SOW THISTLE. Invol. many-flowered, imbricate, of numerous unequal scales, at length tumid at base. Recep. naked. Pap. of white-silky hairs, in many series. Cypselæ compressed, not rostrate.—Leaves mostly spinulous. Heads with many yellow flowers. Europe.

§ Flowers bright yellow, in showy heads. Achenia angular. Perennial........No. 1
§ Flowers pale yellow, in large heads. Achenia flat. Annual. Aug., Sept..Nos. 2, 3

1 **S. arvénsis** L. Smooth, erect, hispid above; leaves runcinate-pinnatifid, spinulous-dentate, clasping with short auricles at base; hds. subumbellate. Fields, waysides, N. Eng., N. Y. 2f. §.

2 **S. asper** Vill. Leaves cordate, amplexicaul, oblong-lanceolate, undulate, spinulous-dentate; ped. subumbellate; fruit oval-obovate, 3-ribbed on each side. 1—2f. §

3 **S. oleràceus** L. Lvs. sagittate-amplexicaul, runcin.-pinnatifid, subspinulous, dentate; ped. downy; involucre at length smooth; fruit many-striate. Rubbish. 2—3f. §

116. HÙMEA ELEGANS. Tall, 4f, branching above into an ample capillary panicle; lvs. lance-ovate, clasping; heads numerous, small, drooping, with dry, loose scales, and 3 or 4 carmine-red florets, with no pales or pappus. N. Hol. July—Oct.

117. CHAPTÀLIA, Vent. Invol. campanulate. Scales in few series, linear, acute. Recep. naked. Ray-fls. ♀, ligulate, disk-fls. ☿, but sterile, bilabiate, lips equal, outer 3-, inner 2-parted. Cypselæ glabrous. Pappus capillary. ♃ Acaulescent. Lvs. all radical. Head cyanic. Mar., Apr.

C. tomentòsa Vent. White-tomentous; lvs. oblong-ovate to lance-oval; hd. nodding in bud, erect in fl., on the scape. Moist barrens, S. 6—12′. Rays 20, rose-colored.

ORDER LXXI. LOBELIACEÆ. LOBELIADS.

Herbs or *shrubs* with a milky juice, alternate, exstipulate leaves and scattered flowers. *Calyx* 5-lobed or entire. *Corolla* monopetalous, irregular, split down to the base on one side. *Stamens* 5, free from the corolla, united into a tube at least by their anthers. *Ovary* adherent to the calyx tube. *Style* 1. *Stigma* surrounded by a fringe. *Fruit* a capsule 2–3-(rarely 1-) celled. *Seeds* numerous, albuminous.

1. LOBÈLIA, L. Cor. tubular, irregular, cleft nearly to the base on the upper side, upper lip of 2 separate lobes, lower 3-lobed. Anth. united above into a curved tube. Stig. 2-lobed. Caps. opening at the summit. Seeds minute. ① ♃ Flowers axillary and solitary, or in terminal, bracted racemes. July—Sept.

¶ Corollas scarlet or bright crimson, large...* Exotic, Nos. 15, 16.....* Native, No. 1
¶ Corollas blue, or blue and white.....† Exotic, Nos. 17, 18....† Native..(*a*)

a Calyx lobes auricled at base, denticulate, shorter than corolla tube....Nos. 2—4
a Calyx lobes auricled at base, entire, linear, long as corolla tube........Nos. 5, 6
a Calyx lobes not auricled, entire,—*b* very slender and long.............Nos. 7—9
—*b* much shorter than corolla...(*c*)
c Leaves cauline, entire, few. Racemes loose, few-flowered......Nos. 10—12
c Leaves radical, entire. Racemes strict, few-flowered............Nos. 13, 14

1 **L. cardinàlis** L. *Cardinal Flower.* Tall, simple, glabrous; lvs. oblong-lanceolate, slightly toothed, acute at each end, sessile; fls. in a terminal, bracted, secund raceme; stam. longer than the corolla. ♃ Swamps. 2—4f. Splendid.

β. ***integérrima.*** Leaves all very entire; stem naked above. Northern N. Y.

γ. ***cándida.*** Flowers white, the segments narrower. Mass.

2 **L. syphilítica** L. *Great Lobelia.* Stem erect, angular; leaves oblong-lanceolate, acute or acuminate, unequally serrate, some hairy; raceme leafy; calyx hispidly ciliate, with the sinuses reflexed. ♃ By streams. 1—3f. Flowers 1′.

β. ***alba.*** Flowers pure white. N. Y. (E. L. Hankenson; G. M. Wilbur).

3 **L. glandulòsa** Walt. Subsimple, leafless above; lvs. lance-lin., acutish, and with the lanceolate, auricled sepals some glandular-toothed; fls. few, remote, large (9″); cal. hispid or smoothish, short. ♃ Damp barrens, Va., and S. 1½—2f. Sept.—Oct.

4 **L. brevifòlia** N. Erect, simple, hispid; lvs. 1′, crowded, oblong-lin., denticulate; sep. ovate, fringe-toothed, half as long as cor. Damp, Fla. to La. 18′. (L. Ludov. C-B.)

5 **L. leptóstachys** A. DC. Glabrous, erect, simple, virgate; lvs. lance-oblong; fls. small (4″), spike not secund; auricles awl-shaped, long. ♃ Prairies, W. and S. 1—2f.

6 **L. pubérula** Mx. Downy or smoothish, erect, simple; lvs. elliptic-ovate, denticulate; fls. large (7—8″), in a long, secund spike; auricles ear-shaped. N. J., W. and S. 2f.

7 **L. amœna** Mx. Erect, simple, smooth; lvs. lanceolate, pointed both ways; fls. large (8–9″), secund, numerous, in a long rac.; bracts very small. ♃ Swamps, Va., and S. 2f.

8 **L. spicàta** Lam. Erect, simple, puberulent; lvs. oblong, mostly obtuse; fls. small (3-4″), crowded in a slender rac.; pedicels and bracts as long as the fl. Dry soils. 1-2f.

9 **L. inflàta** L. *Indian Tobacco.* Erect, branching, hairy; lvs. ovate-lanceolate, serrate; fls. short (4″), with leafy bracts; caps. inflated, large. ① Fields. 1f. Narcotic.

10 **L. Boykínii** T. & G. Slender, smooth; branches erect; lvs. awl-shaped, erect; fls. small (4″), on filiform ped. in long, loose racemes. Wet sands, Ga. Fla. 2f. Lvs. 6″.

11 **L. Nuttállii** DC. Erect, very slender, smooth; lvs. few, linear, remote; fls. few, small (3″); ped. as long as cor.; cal. tube almost none. ② Swamps, L. I., and S. 1-1½f.

12 **L. Kálmii** L. Simple or branched; rt. lvs. spatulate, st. lvs. lance-lin. to lin., all obtuse; rac. loose, leafy; ped. about equalling the showy blue-wh. fls., minutely bracted, or naked (in same specimen); cor. 5″, lobes obovate. Rocky swamps, E. &W. 6-18′.

13 **L. paludòsa** N. Lvs. lin.-spat., thickish, obtuse, petiolate; scape simple, nearly naked; rac. loose, ped. about as long as the cal. ② Bogs, Del., and S. 2-3f. Lvs. 5-10′.

14 **L. Dortmánna,** L. Lvs. submerged, tufted, linear, entire, hollow with 2 longitudinal cells, short, obtuse; scape simple, nearly naked; fls. in a terminal raceme, remote, pedicellate, nodding. ♃ In ponds, N. States. 2—3f. Only the fls. emerging.

15 **L.** FULGENS. Downy, erect, simple; lvs. narrow-lanc., revolute at edge. ♃ Mex. 3f.

16 **L.** SPLENDENS. Smooth, erect; lvs. narrow-lanc., flat; fls. large, in long rac. Mex. 3f.

17 **L.** ERYNUS. Slender, diffuse; lvs. toothed, ellip. to lin.; fls. scattered, bluish. S. Afr.

18 **L.** CŒLESTÌNA, a garden variety, with larger blue flowers, yellow in the centre.

2. DOWNÍNGIA, Torr. Sep. 5, linear. Cor. 2-lipped, *tube not split*, upper lip 2-parted, erect, lower lip 3-lobed. Stam. tube incurved. *Caps. silique-form*, 1-celled, ∞-seeded, opening by 3 linear valves. ① Low, with axillary, solitary flowers. (Clintonia, Doug.)

1 **D.** ÉLEGANS. Stem few-branched, angular; lvs. ovate, acute; ovary curved, 3-angled, longer than the lvs.; corolla blue with a white palate. Oregon! 6—12′. July, Aug.

2 **D.** PULCHÉLLA. Stem much branched; lvs. obtuse; fls. 8″, middle lobe longest. Cal.!

ORDER LXXII. CAMPANULACEÆ. BELLWORTS.

Herbs with a milky juice, alternate leaves, and without stipules. *Flowers* mostly blue, showy. *Calyx* superior, generally 5-cleft, persistent. *Corolla* regular, campanulate, generally 5-cleft, withering, valvate in æstivation. *Stamens* 5, free from the corolla. *Anthers* distinct, 2-celled. *Pollen* spherical. *Ovary* adherent to the calyx, 2 or more celled. *Capsule* crowned with the remains of the calyx, loculicidal. *Seeds* many.

§ Calyx tube short. Pod roundish, opening at the sides. Cor. bell or wheel form... ...CAMPANULA. 1
§ Calyx tube elongated. Pod prismatic, opening at the sides. Corolla wheel-form......SPECULARIA. 2
§ Calyx tube short. Pod ovoid, opening at the top. Corolla bowl-form................PLATYCODON. 3

1. CAMPÁNULA, Tourn. Calyx mostly 5-cleft. Cor. campanulate, or subrotate, 5-lobed, closed at base by the broad, valve-like bases of the 5 stamens. Stig. 3–5-cleft. Caps. 3–5-celled, opening by lateral pores. Mostly ♃. Flowers in racemes or spikes, or few and axillary.

§ Native or naturalized.—*a* Flowers rotate, deeply 5-lobed.................. ....No. 1
—*a* Flowers campanulate, few, or scattered.........Nos. 2—4
—*a* Flowers funnel-form, crowded above....... ....No. 5
§ Exotic.—*b* Sepals appendaged at base. Stig. 3 or 5. Corolla bell-shaped..Nos. 6, 7
—*b* Sepals not appendaged. Stig. 3.—*c* Corolla bowl-shaped.......Nos. 8, 9
—*c* Corolla bell-shaped.......Nos. 10, 11
—*c* Cor. rotate-spreading....Nos. 12, 13

1 **C. Americàna** L. Tall, erect; lvs. ovate-lanceolate, acuminate, uncinately serrate, contracted to a winged petiole, veins often ciliate; fls. axillary, sessile; style exserted, decurved. ♃ Dry copses: common. 2—4f. Fls. 1′ broad, spreading, flat. Aug. †

2 **C. rotundifòlia** L. *Hare-bell.* St. weak, slender; radical lvs. ovate or reniform-cordate, cauline linear, entire; flowers few, nodding, bell-shaped and blue. ♃ Damp rocks, N. States. 1f. Very delicate. June, July. Rt. lvs. seldom found with the fls.

3 **C. aparinoìdes** Ph. Stem weak, slender, branching above, triangular, the angles inversely aculeate; lvs. lance-linear, subentire; fls. terminal, 4″ long, white. In wet meadows. 1—1½f, leaning on the grass like a Galium. June—Aug.

4 **C. divaricàta** Mx. Glabrous, erect, with slender, divaricate, paniculate branches; lvs. narrow-lanceolate, pointed at each end, sharply dentate; fls. campanulate, pendulous on the slender branchlets. Rocky woods, Va., W. and S. 2f. July.

5 **C. glomeràta** L. St. angular, simple, smooth; lvs. lance-oblong, cordate, the lower petiolate; fls. crowded above, cor. funnel-form, violet-blue. Fields, Mass. 2f. § † Eu.
β. AGGREGÀTA. Flowers pale blue, in a dense head, and other var. are cultivated.

6 **C.** MÈDIUM. *Canterbury-bells.* Erect, hispid; lvs. lanceolate; fls. 1½′; stig. 5. ② Eu. 3f.

7 **C.** SPECIOSA. Erect; lvs. lance-linear; fls. racemed, nodding; stig. 3. ♃ Eur. 2f.

8 **C.** PYRAMIDÀLIS. Smooth, branched; lvs. lance-ovate; fls. broad, racemed. ♃ Eu. 6f.

9 **C.** PERSICIFÒLIA. Smooth; lvs. lance-linear, thick; fls. broad, axillary. ♃ Eur. 3f.

10 **C.** TRACHÉLIUM. St. angular, hairy; lvs. ovate, cord. dentate; ped. 1–3-flwd. ♃ Eu. 4f.

11 **C.** RAPUNCULOÌDES. Rough; lvs. ovate, pointed; rac. spicate; fls. nodding. ♃ Eu. 2f.

12 **C.** LÒREYI. St. erect, ang.; lvs. obov. to lance-ovate; cal. hairy; cor. 2′ broad. ① Eu.

13 **C.** GARGÁNICA. St. diffuse; lvs. cord.-reniform to ovate; fls. small, star-shaped. ♃ Eu.

2. SPECULÀRIA, Heist. Calyx 5-lobed, tube elongated. Cor. rotate, 5-lobed. Fil. hairy, shorter than the anthers. Sty. included, hairy. Stig. 3. Caps. prismatic, 3-celled, opening laterally in the upper part. ① Fls. axillary and terminal, sessile, erect.

1 **S. perfoliàta** Lam. St. mostly simple, erect; lvs. reniform-ovate, cordate-clasping, crenate; fls. sessile, aggregate, axillary. Fields, copses. 1f. Fls. deep blue. Jn., Jl.

2 **S. Ludoviciàna** Torr. St. branched, branches slender; lvs. ovate, acute, subentire, sess. or slightly clasping; ovaries slender, fls. smaller (5″ broad). S. Car. to La. 1—2f.

3 **S.** Spéculum. *Venus' Looking-glass.* Stem diffusely branching; lvs. oblong, crenate; fls. solitary, with shallow lobes, blue varying to white, all Summer. S. Eur. Hardy.

3. **PLATYCODON,** A. DC. Cor. large, bowl-shaped. Stig. 5, thick, spreading. Caps. ovoid, opening at the top by 5 acute valves. ♃ Siberia. Smooth and glaucous.

P. grandiflòrum. Lvs. lance-ovate, serrate; fls. 2′, blue var. to wh., few, terminal. 18′.

Order LXXIII. ERICACEÆ. Heathworts.

Plants shrubby or suffruticous, sometimes herbaceous, with *Leaves* simple, alternate or opposite, mostly evergreen, without stipules. *Corolla* regular or somewhat irregular, 4–5-cleft, the petals rarely distinct. *Stamens* as many or twice as many as the petals, free, hypogynous. *Anthers* 2-celled, generally open by pores, often appendaged. *Pollen* (except in Monotropeæ) compounded of 4 united grains. *Embryo* straight, lying in the axis of, or in the end of fleshy albumen. Figs. 64, 89, 90, 99, 114, 248, 255, 311, 438.

§ Ovary adherent, in fruit a berry crowned by the calyx teeth. Shrubs...(Suborder I.)
§ Ovary free.—*x* Shrubs, trees. Capsule or berry with the cells ∞-seeded...(Suborder II.)
—*x* Shrubs. Fruit a capsule with the cells one-seeded...(Suborder III.)
—*x* Herbs half-woody, low.—*y* Leaves evergreen. Stamens distinct...(Suborder IV.)
—*y* Leaves evergreen. Filaments united...(Suborder V.)
—*y* Leaves none. Plants without verdure...(Suborder VI.)

I. VACCINEÆ.—*a* Fls. 5-parted. Berries 10-seeded. Shrubs often resinous-dotted...Gaylussacia. 1
—*a* Flowers 5-parted. Berries ∞-seeded. Shrubs dotless... ....Vaccinium. 2
—*a* Flowers 4-parted.—*b* Petals narrow, reflexed. Berries red........Oxycoccus. 3
—*b* Petals short, spreading. Berries white......Chiogenes. 4
II. ERICINEÆ.—*c* Flowers 4-parted. Sepals colored, larger than the corolla.........Calluna. 5
—*c* Flowers 4-parted. Sepals small...(Gen. 11, or)......................Erica. 6
—*c* Flowers 5-parted.—*d* Petals distinct, or very nearly polypetalous...(*m*)
—*d* Petals united,—monopetalous...(*e*)
e Corolla funnel- or bell-form, with spreading lobes...(*k*)
e Corolla urceolate (ovoid, cylindric or globular), lobes small...(*f*)
e Corolla saucer-form, holding the anthers in 10 pits...... ....Kalmia. 7
e Corolla salver-form, very fragrant. Trailing shrublet.........Epigæa. 8
f Fruit fleshy, the matured ovary 5-seeded.................Arctostaphylos. 9
f Fruit fleshy, the matured calyx ∞-seeded..................Gaultheria. 10
f Fr. dry, capsular,—*g* septicidal. Lvs. linear, heath-like....Menziesia. 11
—*g* loculicidal.—*h* Lvs. linear, moss-like..Cassiope. 12
—*h* Lvs. ample. Shrubs...Andromeda. 13
—*h* Lvs. ample. Trees....Oxydendrum. 14
k Stamens 5, included. Plant and leaves very small.........Loiseleuria. 15
k Stamens 5 (rarely more), long-exserted. Cor. funnel-form..Azalea. 16
k Stamens 10 (rarely fewer), exserted. Cor. bell-form.....Rhododendron. 17
m Corolla very irregular, open before the leaves appear.............Rhodora. 18
m Cor. regular,—*n* 7-petalled. Stamens 14..........................Befaria. 19
—*n* 5-petalled.—*o* Capsule 5-celled....................Ledum. 20
—*o* Caps. 3-celled.—*p* Fls. umbelled..Leiophyllum. 21
—*p* Fls. racemed...Clethra. 22
III. CYRILLEÆ.—*r* Flowers 4-parted, with 8 stamens and a 2-celled capsule..........Elliottia. 23
—*r* Flowers 5-parted,—*z* with 5 stamens and a 2-celled capsule......Cyrilla. 24
—*z* with 10 stamens. Caps. 3-celled, 2-winged..Mylocarium. 25

IV. PYROLEÆ.—*s* Flowers racemed, many. Herbs nearly acaulescent..............PYROLA. 26
—*s* Flowers umbelled, few. Stems ascending. Style very short......CHIMAPHILA. 27
—*s* Flowers solitary (one only).—*t* Capsule 5-celled..................MONESES. 28
—*t* Capsule 3-celled....................SHORTIA. 29
V. ? GALACINEÆ. Anthers 5, one-celled. Capsule 3-celled. Scape spicate.........GALAX. 30
VI. MONOTROPEÆ.—*u* Corolla polypetalous. Plant white, reddish or tawny.......MONOTROPA. 31
—*u* Corolla monopetalous,—*v* campanulate, in a short spike....SCHWEINITZIA. 32
—*v* ovoid, in a loose raceme..........PTEROSPORA. 33

1. GAYLUSSÀCIA, H. B. K. HUCKLEBERRY. Calyx adherent, 5-toothed. Cor. urceolate or campanulate, 5-cleft or toothed. Sta. 10. Anth. awnless, the cells produced upward into tubular beaks opening at the apex. Berry drupe-like, globular, 10-celled, 10-seeded. ♄ ♄ Leaves alternate. Flowers in lateral, bracted racemes, white or reddish, small. Fruit black or dark blue, sweet. May, June.

§ Leaves evergreen, very smooth, with no resinous dots, crenulate...........No. 1
§ Leaves deciduous, sprinkled with resinous dots beneath, entire...........Nos. 2—4

1 **G. buxifòlium** (Salisb.) *Box H.* Lvs. oval to ovate, thick and firm; rac. dense, ped. very short; cor. short-ovoid; berries light blue. Rocky hills, Pa. to Va.: rare. 1f.

2 **G. dumòsa** T. & G. Minutely hairy and glandular; lvs. obovate-oblong, *mucronate;* bracts persistent; cor. short-bell-form; ber. black, large, insipid. Me. to Fla. 1—2f.

3 **G. resinòsa** T. & G. *Black H.* Branches ashy; lvs. oval to lance-obl.; rac. 1-sided, deciduous bracts, ped. short as the fls.; cor. 5-angled, contracted at mouth; sty. exserted; fr. black, round, sweet and eatable, ripe in Aug. Thickets, Can. to Va., and W. 2f.

4 **G. frondòsa** T. & G. *Blue Dangles. High Blueberry.* Lvs. oblong-obovate, pale-glaucous beneath; rac. loose, bracts deciduous, shorter than the ped.; cor. egg-bell-form; berries large, blue, sweet and eatable, in Aug. Thickets, N. Eng. to La. 3—6f.

2. VACCÍNIUM, L. BLUEBERRY. Calyx adherent, 5-toothed. Cor. urceolate, campanulate or cylindric, limb 4- or 5-cleft, reflexed. Sta. 8 or 10, included. Anth. with 2 awns on the back, or awnless, the 2 cells prolonged into a tube opening at apex. Berry 4 or 5 (or partly 8–10)-celled, cells ∞-seeded. ♄ ♄ Leaves alternate. Flowers solitary or racemous, white or reddish, small. Fruit generally eatable. Fig. 90.

§ Anthers 2-awned back of the 2 horns. Leaves deciduous...(*a*)
  a Filaments smooth. Fruit 4–5-celled, blue. Shrubs 1f or less..........Nos. 1, 2
  a Filaments hairy. Fruit partly 10-celled. Taller (2—20f high).........Nos. 3, 4
§ Anthers 2-horned, without the awns. Filaments 10, hairy...(*b*)
  b Leaves evergreen. Flowers 4-parted. Fruit 4-celled......................No. 5
  b Leaves evergreen. Flowers 5-parted. Fruit partly 10-celled...........Nos. 6, 7
  b Lvs. deciduous. Fr. partly 10-celled. Fls. in short, close racemes...(*c*)
    c Corolla bell-shaped. Leaves hairy both sides, entire...................No. 8
    c Corolla cylindrical. Leaves smooth or nearly so.......................Nos. 9—11
    c Corolla ovoid, evidently contracted at the mouth....................Nos. 11—13

1 **V. uliginòsum** L. *Bilberry.* Procumbent; lvs. obovate, obtuse, dull, glaucous beneath; fls. solitary, axillary; cor. ovoid-globous, 4-cleft; stam. 8. White Mts. Jn., Jl.

2 **V. cæspitòsum** Mx. *Bilberry.* Dwarf, cæspitous; lvs. obovate, attenuate at the base, thin, serrate, reticulate with veins, shining; flowers subsolitary; corolla oblong, 5-toothed; stamens 10. White Mountains. 2—3′. July.

3 **V. stamíneum** L. *Deerberry.* Lvs. oval-lanceolate, acute, dull, glaucous beneath; pedicels solitary, axillary, nodding; cor. bell-spreading, seg. acute, oblong; anth. 10, with the long tubes exserted. Dry woods. 2—3f. Fruit greenish-white. May, June.

4 **V. arbòreum** Mx. Lvs. obovate, acute at base, mucronate, veiny, shining above,

pale green and subpubescent beneath; pedicels secund, in leafy racemes; cor. cylindric-bell-shaped, rose-white; anth. 10, included. Woods, S. 8–20f. Fr. black. May, Jn.

5 **V. Vitis-Idæa** L. Decumbent, much branched, smooth, evergreen; lvs. 4–7″, oval, obtuse, thick, margin revolute, pale beneath; fls. solitary or in short clusters, 4-parted; corolla campanulate. Hills and mts., N. Eng.: rare. June, July.

6 **V. Myrsinítes** Mx. Erect, much branched; lvs. small, elliptical, acute at each end, glabrous, serrulate; fls. in small lateral clusters of 2—5; cor. ovoid, urceolate; style slightly exserted. Woods, S. 1f. Whole plant often purplish. March, April.

7 **V. myrtifòlium** Mx. St. simple, decumbent at base, from long, creeping roots; lvs. 1—2′, cuneate-obovate or oval, pale beneath; fls. in dense, sessile, lateral clusters of 6—12; cor. oblong-cylindric; fr. round, black. Woods, S. 1f. Mar., April.

8 **V. Canadénse** Rich. Branches reddish-green, pubescent, leafy; lvs. elliptic-lanceolate, acute at each end; rac. fasciculate, sessile, subterminal; cor. campanulate; cal. lobes acute. Rocky thickets, N. Eng., and W. 8—12′. Berries blue, sweet. May.

9 **V. Pennsylvánicum** Lam. *Common Low Blueberry.* Branches green, with 2 pubescent lines; lvs. 1′, crowded, elliptic-oblong, acute at each end, bristly-serrulate, shining; fls. in short, bracteate, dense rac. Hard soils, Can. to Pa. Ber. blue, sweet.

β. ***nigrum.*** Dark green; berries black and shining, without bloom.

γ. ***alpinum.*** Dwarf, decumbent; lvs. small (3—4″), narrow-oblanceolate. Mts.

10 **V. vacíllans** Soland. Low, bushy; lvs. oval to ovate, acute or mucronate, pale green, dull, glaucous beneath, minutely serrulate; rac. dense-flowered, preceding the full-grown lvs. Hilly woods, N. Eng. to Tenn. 1—2½f. Fr. blue-black, sweet. May, Jn.

11 **V. corymbòsum** L. *Common High Blueberry.* Tall; flowering branches nearly leafless; leaves oval to lanceolate, acute or acuminate at each end, *entire*, pubescent when young, often glaucous beneath; rac. short, sessile; cor. cylindrical to ovoid. Low woods. 5—10f. March—June.—Varies exceedingly.

β. ***virgàtum.*** Branchlets leafless, covered with rose-colored rac. Sts. virgate. 5f. S.

γ. ***amœnum.*** Lvs. oblong; fls. cylindric, large, roseate; sty. included; fr. blk. 8f.

δ. ***fuscàtum.*** Lvs. serrulate; ped. elongated; sty. exserted; fls. striped with red. 3f.

ε. ***glabrum.*** Plant glabrous throughout, the leaves entire. Rare.

12 **V. galèzans** Mx. Flowering branches leafy; lvs. sessile, cuneate-lanceolate, subserrate, veiny, glabrous when old; flowers in small, sessile fascicles; corolla small, yellowish; style exserted; fruit small, black. Swamps, S. 1f. April +.

13 **V. hirsùtum** Buckley. Whole plant, with fls. and fr., densely hirsute; lvs. ovate, entire; corolla oblong, nearly closed at mouth; berry round. Mts. of N. Car. 1f.

3. OXYCÓCCUS, Pers. CRANBERRY. Calyx adherent, 4-cleft. Cor. 4-parted, with long, narrow, reflexed segments. Sta. 8. Anth. tubular, 2-parted, opening by oblique pores. Berries globous, 4-celled, many-seeded. ♄ ⌊ Delicate, with alternate lvs., red and purple berries on slender ped.

* Stem erect, with membranous, deciduous leaves. Berries sweetish...........No. 1

* Stem prostrate, slender. Leaves evergreen, small. Berries acid..........Nos. 2, 3

1 **O. erythrocárpus** Ell. Lvs. oval, acuminate, thin, ciliate-serrulate; fls. axillary, solitary, the long segments at length reflexed. Mts. of Va. and Car. 1—2f. June.

2 **O. palústris** Pers. Sts. filiform, purple; lvs. ovate, entire, revolute on the margin; pedicels terminal, 1-flowered; corolla pink, segments ovate. Alpine bogs, N.

3 **O. macrocárpus** Pers. St. filiform; lvs. oblong, obtuse at each end, edges revolute, glaucous beneath; pedicels axillary, elongated, 1-flowered; corolla segm. linear-lanceolate. Sphagnous swamps, Va., and N. Fruit large, valuable. June.

4. CHIÓGENES, Salisb. Calyx 4-cleft, persistent. Cor. broadly campanulate, limb deeply 4-cleft. Stam. 8. Anth. cells distinct, awnless on the back, bicuspidate at apex, opening longitudinally. Ov. adherent. Fr.

white, 4-celled, many-seeded. ⌊⌣ Delicate. Lvs. very small, alternate, with the flavor of the Checkerberry. Cor. small, wh., axillary, solitary. Fig. 248.

C. hispídula T. & G.—In old woods, N. Eng., N. and W. Stems creeping, slender, 1—3f. Leaves oval, 4—6″. Berries very small. May, June.

5. CALLÙNA, Salisb. HEATHER. Cal. of 4 scarious, colored sepals. Cor. campanulate, 4-parted, shorter than the calyx. Stam. 8. Anth., 2-crested on the back, cells opening laterally. Stig. 4-lobed. Caps. 4-celled, 8-seeded, 4-valved. ♄ Lvs. opposite, minute, crowded. Fls. axillary, or crowded in 1-sided racemes, scarious, roseate, with 4—6 scarious bracts.

C. vulgàris Salisb.—Low grounds, Tewksbury! Mass., Me., and N. 2f. Lvs. ⅛″.

6. ÉRICA, L. HEATH. Cal. 4-parted. Cor. tubular, bell-, cup-, urn-, globe-, egg-, or salver-form, the limb in 4 short lobes. Stam. 8. Sty. filiform. Caps. 4-celled, opening by 4 loculicidal valves. Sds. 2—∞ in each cell. ♄ Very delicate, chiefly S. African, branching and brittle. Leaves whorled, rarely alternate, linear or acerous. Flowers nodding, cyanic.

1 **E. cinèrea** L. *Scotch Heath.* Stems clustered; branchlets and linear lvs. (1″) in 3's, crowded: fls. racemous-clustered on the upper branchlets; cal. colored, with few or no bractlets, ⅓″; cor. purple, oval, 2″; anth. included, awned beneath. Sandy "moors," Nantucket Is.! Found by Mrs. E. E. Atwater, June, 1868. Apparently indigenous.

2 **E.** CARNEA. Very slender, 6—10′; leaves in 3's or 4's, 2—3″ long, obtuse; flowers axillary; corolla 2″, and calyx 1″, flesh-color; anthers dark-purple, exserted. Alps. April.—Of the 400 known species, only this is yet common in cultivation.

7. KÁLMÌA, L. AMERICAN LAUREL. Cal. 5-parted. Cor. with 10 prominences beneath and 10 corresponding cavities within, including the 10 anthers. Border 5-lobed. Fil. elastic. Caps. 5-celled, many-seeded. ♄ ♄ Beautiful, N. American. Leaves entire, evergreen, coriaceous. Flowers in racemous corymbs, white and red, in May—July.

* Flowers in terminal corymbs. Leaves thick, mostly acute................Nos. 1, 2
* Flowers in lateral corymbs. Leaves obtuse.................................Nos. 3, 4
* Flowers solitary, axillary. Sepals nearly as long as the corolla...............No. 5

1 **K. latifòlia** L. *Calico Bush. Spoon-wood.* Lvs. alternate and ternate, oval lanceolate, acute at each end, smooth and green on both sides; corymbs terminal, viscidly pubescent. Woods, Me. to O., Ky., and Fla. 5-20f. Profusely and splendidly flowering.

2 **K. glauca** Ait. *Swamp Laurel.* Branches ancipitous; lvs. opposite, subsessile, lanceolate, polished, glaucous beneath, revolute at the margin; corymbs terminal, the peduncles and bracts smooth. Bogs, Pa., and N. 2-3f. Lvs. 1′. Corymbs 8-10-flowered.

β. ***rosmarinifòlia.*** Leaves linear, more revolute, green beneath.

3 **K. angustifòlia** L. *Sheep-poison.* Lvs. ternate and opposite, elliptical-lanceolate, petiolate, obtuse at each end, smooth; corymbs lateral; bracts linear-lanceolate. Hills and copses, Can. to Ky. and Car. 2—4f. Flowers deep purple, few in each cluster.

4 **K. cuneàta** Mx. Lvs. scattered, sessile, cuneate-oblong, obtuse, mucronate, glandular-pubescent beneath; flowers white, in sessile clusters. Swamps, Car.: rare. 3f.

5 **K. hirsùta** Walt. Slender, branched, hairy; leaves scattered or opposite, ovate to linear-oblong, as long as the pedicels (4—6″). Barrens, S.: common. 1f. Fls. 7″.

8. EPIGǼA, L. TRAILING ARBUTUS. MAY-FLOWER. Cal. large, 5-parted, with 3 bracts at base. Cor. salver-form, tube villous within, limb

5-parted, spreading. Stam. 10. Anth. dehiscent by 2 longitudinal openings. Caps. 5-celled, 5-valved. ⌊ Trailing, with cordate, ovate, entire, alternate leaves, and axillary clusters.

E. repens L.—Rocky woods, N. Eng. to Pa., Ky., and N. Stems half-shrubby, hairy, 10—15′ long. Lvs. evergreen, 2′. Fls. rose-colored, delightfully fragrant. Apr., May.

9. ARCTOSTÁPHYLOS, Adans. BEAR-BERRY. Cal. 5-parted, persistent. Cor. ovoid, diaphanous at the base, limb with 5 small recurved segments. Anth. 10, with 2 long, reflexed awns, and opening by pores. Drupe or berry 5–10-celled, the cells 1-seeded. ♄ Trailing. Leaves alternate. Racemes terminal.

1 **A. Uva-ursi** Spr. Lvs. entire, thick, evergreen, shining above, obovate; flowers drooping; drupe red, as large as a currant, the nut 5-seeded. Rocky hills, N. May.

2 **A. alpìna** Spr. Lvs. thin, serrate, deciduous, obovate, acute, strongly netted; ped. hardly longer than the bractlets; drupes black. High mts., Me., N. H., and N.

10. GAULTHÈRIA, Kalm. CHECKERBERRY. WINTERGREEN. Cal. 5-cleft, with 2 bracts at the base. Cor. ovoid-tubular, limb with 5 small, revolute lobes. Fil. 10, hirsute. Caps. 5-celled, invested by the calyx, which becomes a berry. ♄ Leaves alternate. Pedicels bibracteolate.

G. procúmbens L. St. procumbent, with the branches erect or ascending; lvs. obovate, mucronate, denticulate, crowded at the top; fls. few, drooping, terminal. Woods and pastures, Can. to Penn. and Ky. 3′. Red berries and leaves spicy. June—Sept.

11. MENZIÈSIA, Smith. Cal. deeply 4- or 5-cleft. Cor. urceolate or campanulate, 4- or 5-lobed. Sta. 8 or 10, anth. opening by terminal pores. Caps. 4- or 5-celled, opening septicidally. Seeds ∞. Low, shrubby plants, of various habits. Flowers in terminal clusters.

§ PHYLLODOCE, Salisb. Lvs. evergreen, heath-like. Fls. 5-parted, bell-form....No. 1
§ MENZIESIA *proper*. Leaves deciduous. Flowers 4-parted, urceolate..........No. 2

1 **M. taxifòlia** Robbins. *Mountain Heath.* St. prostrate at base; lvs. linear, obtuse; pedicels erect, slender, terminal, aggregate, 1-flowered. Alpine bogs, N. H., Me., and N. 6—12′. Leaves 6—7″. Flowers purple, the ped. 18″. June.

2 **M. ferrugínea** Smith. β. ***globulàris*** Sims. Shrub low, straggling, pubescent; leaves lance-oval, ciliate; flowers small, nodding, on slender pedicels, greenish-purple. Mts., Penn. to Car. 3—4f. June.

12. CASSIÒPE, Don. MOSS-PLANT. Sep. bractless, imbricated, ovate. Cor. globular-campanulate, 4- or 5-lobed. Anth. 8 or 10, pendulous, cells opening by a terminal pore, with a long reflexed awn behind. Caps. 4- or 5-celled, valves 2-parted. Placentæ pendulous, ∞-seeded. ♄ Small, alpine, moss-like or heath-like shrubs. Flowers solitary, pedicellate.

C. hypnoìdes Don. Stem filiform, tufted; leaves evergreen, subulate, smooth, crowded; flowers 5-parted, purple, nodding. High mts., N. H., N. Y., Me. 2—3′. Jn.

13. ANDROMÈDA, L. Cal. 5-parted, persistent, not becoming fleshy in fruit. Cor. urceolate, the mouth more or less contracted, 5-toothed. Anth. 10, cells 2, opening by a terminal pore. Caps. 5-celled, 5-valved, often re-enforced with 5 external valvelets. Seeds ∞. ♄ ♄ with entire, or serrulate, alternate leaves. Figs. 64, 438.

§ Sepals valvate in the early bud. Fls. in clusters. Caps. globular...(c)
§ Sepals imbricate in the bud. Capsule depressed...(a)
  a Fls. solitary, axillary. Pericarp double. Anth. awnless. (Cassandra)..Nos. 1, 2
  a Flowers in axillary racemes. Pericarp simple, with 5 entire valves...(b)
    b Anth. awnless. Bractlets at the base of the pedicels. (Leucothoe)..Nos. 3—5
    b Anth. 2-awned. Bractlets at the base of the calyx. (Eubotrys)....Nos. 6, 7
  c Flowers in a terminal nodding umbel. Cor. globular. (Euandromeda).....No. 8
  c Flowers in racemes, panicled or axillary...(d)
    d Capsule with 5 narrow valvelets applied to the sutures...(e)
    d Capsule naked. Corolla ovoid. Anthers 2-awned. (Portunia)...Nos. 9, 10
      e Corolla oblong. Filaments or anthers 2-awned. (Pieris)....Nos. 11—13
      e Corolla globular. Filaments and anth. awnless. (Lyonia)...Nos. 14—16

1 **A. calyculàta** L. *Leather-leaf.* Lvs. oblong, obtuse, flat, acute at base, rusty beneath; fls. white, each with a leaf, in leafy racemes; cal. 2-bractleted at base, sep. acute; inner pericarp 10-valved, thin. Bogs, Can. to Car. and Wis. 3f. April +.

2 **A. angustifòlia** Ph. Leaves linear-lanceolate, acute, the margins revolute; calyx segments acuminate, 2-bracteolate. Otherwise as No. 1. Swamps, S. Car., Ga.

3 **A. axillàris** Lam. Leaves oblong, acute, denticulate, petiolate; rac. dense, short; sepals roundish, obtuse. Banks, low country, Va. to Fla. 2—4f. Evergreen. Mar.

4 **A. Catesbæi** Walt. Lvs. lance-ovate, conspicuously pointed, petiolate, finely serrulate; rac. dense, nodding, nearly as long as the leaves; sep. ovate, acute. Banks, up-country, Penn. to Ga. 2—5f. Racemes 2—3′, white. Evergreen. May.

5 **A. acuminàta** L. *Pipe-wood.* Leaves very smooth, rigid, lance-ovate, gradually pointed, entire; rac. loose, short; branches hollow. Swamps, S. 3—10f. April.

6 **A. racemòsa** L. Lvs. lance-oval, slightly pointed, serrulate, deciduous; rac. strict, ascending, terminal, naked, long and 1-sided; sep. ovate, acuminate; anth. cells each 2-awned at apex; seeds wingless. Wet woods. 2—6f. Rac. 2—3′, white. Jn., July.

7 **A. recúrva** Buckley. Lvs. deciduous, lance-ovate, acuminate; anth. cells each 1-awned; pod 5-lobed; sds. winged, flat; branches recurved-spreading. Mts., Va., N. Car.

8 **A. polifòlia** L. *Wild Rosemary.* Erect, smooth, glaucous; lvs. oblong-linear, with margins revolute, white beneath (2—3′); umb. 5-9-flwd., roseate. Bogs, N. 1f. Jn.

9 **A. floribúnda** Lyon (Ph.) Lvs. thick, evergreen, lance-oblong, acute or pointed, bristly-serrulate; rac. paniculate, crowded; bractlets minute; cor. white; anth. awns 2, reflexed, white. Mts., Va. to Ga. 2—10f. Flowers numerous and handsome. Apr.

10 **A. phillyræfòlia** Hook. Lvs. thick, shining, evergreen, elliptic-oblong, obtuse, serrulate above; rac. subterminal, loose; sep. lanceolate; cor. oval; anth. each with 2 long reflexed black awns. Woods, Quincy, Fla. 1—3f. (A. Croomii, C-B.)

11 **A. nítida** Bartram. *Fetter-bush.* Lvs. thick, evergreen, shining, elliptical, acuminate at each end, margins veined and revolute; umbels axillary, nodding, roseate; branches sharply angled. Low pine-barrens, S. 3—6f. March, April. Elegant.

*β? **rhombifòlia.*** Leaves broad-oval; sepals ½ as long as the ovoid corolla. Fla.

12 **A. Mariàna** L. *Stagger-bush.* Lvs. thin, deciduous, oval, entire, acutish; flowering branches leafless; fls. large (4—5″), white or reddish, in lateral crowded fascicles; sepals linear, ½ as long as the cylindric corolla. Sands, N. J. to Fla. 3f. June, July.

13 **A. speciòsa** Mx. Lvs. oval, obtuse, serrate, veiny, deciduous; flowering stems mostly leafless, branched; sepals ¼ as long as the large bell-shaped white corolla. Swamps, S. June.—Varies with the leaves broad, crenate, whitish beneath.

14 **A. ligustrìna** Muhl. Pubescent; lvs. deciduous, lance-obovate to obovate, short-acuminate, serrulate; rac. panicled on the leafless flowering branches. Wet soils, Ct. to Fla. 6f. June.—Var. with small lvs. scattered among the small (1″) downy fls. S.

15 **A. ferrugínea** Walt. Lvs. thick, rigid, evergreen, obovate to oblanceolate, rusty beneath, revolute-edged; umb. axillary; fls. small (1″); valvelets nearly as broad as the valves. Pine-barrens, S. 3—20f. Shrub or small tree. Apr., May. (A. rigida Ph.)

16 **A. montàna** Buckley. Lvs. evergreen, lance-ovate, ciliate-serrulate; fls. in large panicles; pedicels pubescent, with 3 linear bractlets. Mts., N. Car. 4—6f.

14. **OXYDÉNDRUM**, DC. SORREL-TREE. Sep. bractless, valvate in the early bud. Cor. urceolate, ovoid, 5-toothed. Anth. 10, linear, erect, awnless, cells opening lengthwise. Capsule oblong, truncate, 5-celled, 5-valved. Seeds ∞. ♄ Lvs. petiolate, oblong-lanceolate, acuminate, serrulate. Flowers white, in terminal panicles of slender, spicate racemes.

O. arbòreum DC.—Ohio, Penn., and S. along the Alleghany Mts. Tree 40–50ft. Jn., Jl.

15. **LOISELEÙRIA**, Desv. ALPINE AZALEA. Calyx 5-parted, lobes equal. Cor. subcampanulate, 5-parted, regular. Sta. 5, equal, erect, shorter than the corolla, anth. dehiscing laterally. Style straight, included. Caps. 2- or 3-celled, 2- or 3-valved, ∞-seeded. ♄ Delicate, procumbent, tufted, with opposite, petiolate, entire leaves. Pedicels terminal, solitary, 1-flowered. Corolla rose-color.

L. procúmbens Desv.—Summit of the White Mts., N. H. A tiny shrub, 3—6′. Lvs. elliptical, 3″, margins revolute. Flowers nearly sessile. June, July.

16. **AZÀLEA,** L. SWAMP PINK. Cal. small, 5-parted. Cor. funnelform, somewhat irregular, with 5 spreading lobes. Sta. 5. Fil. and style long, exserted, declined, anth. opening by pores. Caps. 5-celled, 5-valved, ∞-seeded. ♄ Erect. Lvs. alternate, deciduous, oblong or obovate, entire. Flowers in umbelled clusters, terminal, large and showy. Fig. 114.

§ Calyx lobes all (or rarely one excepted) very short or minute...............Nos. 1, 2
§ Calyx lobes all oblong and of conspicuous length.—*a* Native..............Nos. 3, 4
—*a* Exotic..................Nos. 5, 6

1 **A. viscòsa** L. Branchlets hispid; leaves obovate-oblong, the edges, midvein, and petiole bristly; fls. appearing after the lvs., very viscid, the tube much longer than the segments; stamens exserted; style much longer. Swamps. 4—10f. May—July.

β. ***nitida.*** Lvs. smooth, green, shining, oblanceolate. Dry woods, N. 1—2f.

γ. ***hispida.*** Lvs. very hispid above, smooth and glaucous beneath. Mts., Pa.

2 **A. nudiflòra** L. *Pinxter-bloom.* Young branchlets and lvs. beneath pubescent; clusters naked, appearing with or before the young lvs.; corolla slightly viscid, tube downy, scarcely longer than the segm. Woods: more common S. 3—7f. Apr.+.—Varies with the flowers *pink*, *deep purple*, *white-variegated*, *white* with a buff centre, and *buff* all over; the latter two fragrant. Also, with 10—20 stamens.

3 **A. calendulàcea** Mx. *Flaming Pinxter.* Young branchlets pubescent; lvs. attenuated to the base, corymbs nearly or quite leafless; tube of the cor. hirsute, not viscid, shorter than the ample lobes. Upland woods, O., Pa., and S. 3—10f. May, Jn.—The splendid flowers vary to *yellow-scarlet*, *flame-color*, *brick-red*, *saffron-yellow*, &c.

4 **A. arboréscens** Ph. Branches smooth; lvs. obovate, glabrous, glaucous beneath, margins ciliate; corymbs leafy with full-grown leaves; corolla tube not viscid, longer than the lobes. Mts., Penn., and S. 10—20f. May—July.

5 **A.** INDICA. Strigous, but not glandular; lvs. wedge-lanceolate, acuminate, ciliate; fls. terminal, 1—3 together. Japan. Fls. scarlet, crimson, white, &c. Splendid.

6 **A.** PÓNTICA. Lvs. oblong, acute, margin ciliate; fls. viscid, corymbed, after the leaves; tube equalling the limb, yellow, very fragrant. Asia Minor.

17. **RHODODÉNDRON,** L. ROSE BAY. Calyx small, deeply 5-parted, persistent. Cor. campanulate, often slightly unequal, 5-lobed. Stam. 10 (rarely fewer), mostly declinate, anthers opening by 2 terminal pores. Caps. 5-celled, 5-valved, many-seeded. ♄ ♄ With alternate, entire leaves. Flowers in dense, terminal umbels from large, scaly buds. Figs. 99, 311.

* Leaves obtuse at each end. Flowers purple or lilac, not spotted............Nos. 1, 2
* Leaves acute or acuminate, dotted or discolored beneath. Fls. spotted...Nos. 3, 4, 5
* Leaves acuminate, scarcely paler beneath. Flowers very broad, purple.........No. 6

1 **R. Lappónicum** Wahl. *Lapland Rose Bay.* Dwarf; lvs. elliptical, very small, roughened with concave rusty scales both sides; fls. small (7″), lobes equal, purple; sta. 5, 7, or 10, exserted. High mts., N. Eng., N. Y. 8—10′, very bushy. June, July.

2 **R. Catawbiénse** Mx. *Catawba Rose Bay.* Lvs. oval, rounded-obtuse at each end, paler beneath, smooth; cal. lobes oblong, elongated; cor. broad-campanulate, lilac-purple, large (14″); stam. 10. High mts., Va., N. Car. 3—6f. Lvs. 3—5′. Jn. †

3 **R. punctàtum** Andr. Lvs. elliptical, acute or acuminate, glabrous, the lower surface and dense corymbs covered with resinous dots; fls. bell-funnel-form, pink-red, green-spotted within, the lobes wavy. Uplands, Car., Ga. 4—6f. Lvs. 2—3′. Jn., Jl. †

β. ***Chapmánii.*** Lvs. oval-obovate, obtuse, small (1—2′); sepals minute. W. Fla.

4 **R. máximum** L. Lvs. obovate-oblong, acute, smooth, coriaceous, rusty beneath, revolute on the margin; cal. lobes oval, obtuse; cor. white to roseate, spotted within; lobes unequal, roundish. Along streams, N. Eng. to Ga. 6—20f. Splendid. †

5 **R.** ARBÒREUM. Lvs. lanceolate, silvery-spotted beneath; cor. lobes crenulate and curled, white, buff, red, crimson, &c.; calyx downy. Himmaleh Mts. 5—20f.

6 **R.** PÓNTICUM. Lvs. lance-oblong, attenuated to each end, smooth, green both sides; corolla bell-rotate; calyx smooth. Asia Minor. Low bush, flowers broad (2′), purple.

18. RHODÒRA, Dunham. Cor. adnate to the 5-toothed calyx, deeply divided into 3 segments, upper one much the broadest, 2–3-lobed at the apex, in bud enfolding the 2 lower. Sta. 10, declinate, fil. unequal, anthers opening by 2 pores. Caps. 5-celled, 5-valved. Cells many-seeded. ♄ With alternate leaves, and pale-purple flowers. April, May.

R. Canadénsis L.—Woods or swamps, N. Eng. to Penn. 2—3f. Fls. in terminal clusters, 1′, appearing before the oblong leaves, which are downy-canescent beneath.

19. BEJÀRIA, Mut. Fls. heptamerous. Calyx 7-toothed, campanulate. Corolla of 7 distinct petals. Sta. 14. Caps. 7-celled, 7-valved, many-seeded. ♄ With alternate, entire lvs., and fls. in dense, racemous panicles.

B. racemòsa Vent. Branches hispid and glutinous; lvs. ovate-lanceolate, glabrous; racemes terminal, white. Sandy soils, Ga., Fla. 3—4f. June, July.

20. LÈDUM, L. LABRADOR TEA. Calyx minute, 4-toothed. Cor. 5-petalled, spreading. Sta. 5—10, exserted, anthers opening by 2 terminal pores. Caps. 5-celled, opening at the base. ♄ Lvs. alternate, entire, ferruginous-tomentous beneath, coriaceous. Fls. in terminal corymbs, white.

L. latifòlium Ait. Lvs. elliptic-oblong, strongly revolute at edge; sta. 5—7, scarcely exserted. Mountains, Penn., to Greenland. 2—4f. May—July.

21. LEIOPHÝLLUM, Pers. SAND MYRTLE. Calyx 5-parted. Pet. 5, ovate-oblong, spreading. Sta. 10, exserted, anthers dehiscing by lateral clefts. Caps. 3-celled, 3-valved, many-seeded. ♄ Glabrous, with erect branches. Lvs. alternate, entire, oval, coriaceous, revolute-edged. Corymbs terminal. Flowers white.

L. buxifòlium Ell.—Pine-barrens, N. J. to Car. 8—12f. Leaves shining. May.

22. CLÈTHRA, Gært. SWEET PEPPER-BUSH. Cal. 5-parted, persistent. Pet. 5, distinct, obovate. Sta. 10, exserted, anth. inverted in the bud, at length erect. Style persistent, stigma 3-cleft. Caps. 3-celled, 3-valved

∞-seeded, enclosed by the calyx. ♄ ♄ Lvs. alternate, petiolate. Flowers white, in downy-canescent racemes. Bracts deciduous.

1 **C. alnifòlia** L. Lvs. cuneiform-obovate, acute, acuminately serrate, green on both sides, smooth or slightly pubescent beneath; racemes terminal, elongated, simple or branched; bracts subulate. Swamps, N. Eng. to Ga. 3—8f. Fragrant. July, Aug.
β. ***tomentòsa.*** Lvs. tomentous beneath; spikes subpanicled; fls. 3″. S. Apr.–Jn.
γ. ***scabra.*** Lvs. coarsely serrate, rough-downy both sides. Ga. (Bainbridge). Pet. 2″.

2 **C. acuminàta** Mx. Arborescent; lvs. glabrous, glaucous beneath, oval, acuminate, abruptly acute at base, finely serrate, on slender petioles; rac. terminal, solitary; bracts long, caducous. Mts., Va., Ky., to Car. 10—18f. Lvs. 4—6′. July, August.

23. **ELLIÓTTIA,** Muhl. Calyx small, 4-toothed. Corolla of 4 petals slightly cohering at base. Stamens 8, anth. sagittate. Style slender, with a capitate, undivided stig. Caps. 3-celled, 3-seeded. ♄ With virgate-branched, alternate, lanceolate, entire leaves, and terminal racemes of white flowers.

E. racemòsa Muhl.—Dry, rich soils, S. Ga. 4—8f. Racemes bractless. June.

24. **CYRÍLLA,** L. Cal. 5-parted, minute. Pet. 5, distinct, spreading. Sta. 5, anth. opening lengthwise. Style short, with 2 stig. Caps. 2-celled, 2-seeded, indehiscent. Seeds suspended. ♄ Branches irregularly whorled, with entire, elliptic-oblanc. lvs., and the white fls. in slender clustered rac.

C. racemiflòra Walt.—Sandy swamps, S. 12—18f. Lvs. 2—3′. Rac. 4—6′. June.

25. **MYLOCÁRIUM,** Willd. BUCKWHEAT TREE. Calyx 5-toothed, minute. Pet. 5, obovate, obtuse. Sta. 10, very short, fil. thickened below. Caps. corky, 2- or 3-winged, 3-celled, with 3 subulate seeds. ♄ Very smooth, with branches irregularly whorled, elliptical leaves, and terminal racemes of white, fragrant flowers.

M. ligustrìnum Willd.—Borders of swamps, Ga. and Fla. 4—8f. April, May.

26. **PÝROLA,** Salisb. WINTERGREEN. Cal. 5-parted. Pet. 5, equal. Sta. 10, anth. large, pendulous, fixed by the apex, 2-horned at base, opening by 2 pores at top. Style thick, as if sheathed. Stig. 5, appearing as rays or tubercles. Caps. 5-celled, opening at the angles, many-seeded. ♃ Low, scarcely shrubby, evergreen herbs. Lvs. radical or nearly so, entire. Scapes mostly racemous, from a decumbent stem or rhizome. Fig. 99.

§ Stamens and style straight. Stigmas peltate, 5-rayed. June, July..........Nos. 1, 2
§ Stamens ascending. Style declined and curved. Stigma 5-tubercled...(*a*)
  a Leaves dull (not shining). Petals greenish-white.....................Nos. 3, 4
  a Leaves thick and shining. Flowers white or rose-colored.............Nos. 5, 6

1 **P. minor** L. Lvs. round-ovate, repand-crenulate, longer than their petioles; rac. spike-like; corolla globular, including the short style. Woods, N. H., and N. July.

2 **P. secúnda** L. Lvs. broadly ovate, acute, subserrate, longer than the petiole; rac. secund; cor. oblong; style exserted. Woods, N. States. 5—8′. Lvs. near the base.
β. ***pùmila*** (Paine). Lvs. nearly orbicular, thin; scape 3-6-flowered, 4—8′. N. Y.

3 **P. chlorántha** Swartz. Lvs. orbicular, crenulate, shorter (1′) than the petiole; scape tall (6—12′), few-flowered; segm. of the cal. very short, obtuse; pet. half-open, oval, greenish; anth. conspicuously tubular. Woods, N. States and Can. June, July.

4 **P. ellíptica** N. Leaves oval or elliptical, thin, longer than their petioles; scape naked, 6-10-flowered; sep. very short and obtuse; anth. pores blunt; fls. nodding, fragrant. Woods, N. States and Can. 3—9′. Petioles white. June, July.

5 **P. rotundifòlia** L. Lvs. round-ovate, shorter than the petiole, thick; scape 3 angled, bracted below, ∞-flowered; sepals ovate, obtuse; anther pores distinctly tubular. Woods, Can. to Car., and W. 8—14′. Flowers large. June, July.

β. *uliginòsa.* Lvs. dull, 1½′, the stalk much longer; sep. acute; fls. smaller.

6 **P. asarifòlia** Mx. Lvs. round-reniform, thick, shining, shorter than the petiole; scape angular; rac. lax, ∞-flowered; sepals lanceolate, acute; anther pores blunt. Old woods, N. States and Can. 6—12′. Flowers purple. June.

27. CHIMÁPHILA, Ph. PIPSISSIWA. Cal. 5-parted. Pet. 5, spreading. Stamens 10, fil. dilated in the middle, anth. cells produced into tubes, opening by a 2-lipped pore at apex. Style very short, thick. Capsule 5-celled, opening from the summit. ♄ Small, glabrous. Leaves cauline, serrate, thick. Ped. scape-like. Flowers terminal, nodding, roseate. Fig. 255.

1 **C. umbellàta** Nutt. *Prince's Pine.* Lvs. cuneate-lanceolate, shining, 1-colored, serrate, in 4's—6's; umbel 4-7-flowered. Dry woods. 8—12′. July.

2 **C. maculàta** Pursh. Lvs. lanceolate, acuminate, rounded at base, remotely serrate, discolored, opposite or in 3's; ped. 2-3-flowered. Sandy woods. 6—8′. Jn., Jl.

28. MONÈSES, Salisb. Calyx 5-parted. Cor. 5-parted, rotate. Sta. 10, regular, 2-spurred at base, opening by 2 tubular pores at apex. Style straight. Stig. 5-lobed. Caps. 5-valved, 5-celled, ∞-seeded. ♃ Low, simple, smooth. Lvs. at top of the stem, roundish, serrulate, petiolate, veiny. Peduncle terminal, longer than the stem.

M. grandiflòra Salisb.—Mossy woods, N. Eng., N. Y.: rare (com. in Oreg.) 3′. Scape with a bract in the midst, and a single, terminal nodding white flower, 6″ broad. Jn.

29. SHÓRTIA, Gray. (This genus was founded upon an imperfect specimen in the Herbarium of Michaux, labelled, " High mountains of Carolina." It has never been seen in this country, but grows in Japan.)

30 ? GALAX, L. BEETLE-WEED. Cal. of 5 distinct, persistent sepals. Cor. of 5 oblong-obovate, distinct petals. Fil. 10, united into a tube with as many teeth, those opposite the petals sterile. Anth. 5, 1-celled, opening across the top. Caps. 3-celled. Seeds ∞, enclosed in a loose, cellular testa. ♃ Roots tufted, creeping, deep red, sending up roundish-cordate, long-stalked, glabrous leaves and a scape bearing a dense raceme of white flowers. (The order of Galax is yet undetermined.)

C. aphýlla L.—Damp woods, Md. to Tenn., and S. Lvs. 2—3′. Scape 1—2f. Jl., Aug.

31. MONÓTROPA, L. INDIAN PIPE. PINE SAP. Sep. 1—5, bract-like. Pet. 4—5, connivent in a bell-shaped corolla, gibbous at base. Sta. 8—10, anthers opening transversely at apex. Stig. 5-rayed. Caps. 4–5-celled, 4–5-valved. Seeds ∞, minute.—Low, parasitic herbs, destitute of green herbage, furnished with scale-like bracts instead of leaves.

§ Sepals (or bracts) 1—3. Flowers solitary, scentless. Style very short.......No. 1
§ Sepals 4 or 5. Flowers in a secund raceme, fragrant. Style long............No. 2

1 **M. uniflòra** L. *Indian Pipe. Bird's-nest.* St. short; scales approximate; fl. nodding; fr. erect. Common in woods. 6—8′. Plant whitish. June—Sept.

2 **M. Hypópitys** L. *Pine Sap. Bird's-nest.* More or less downy; pedicels as long as the flower; caps. subglobous. Woods: com. 6—10′. Plant tawny. June—Aug.

32. SCHWEINÍTZIA, Ell. CAROLINA BEECH-DROPS. Calyx persistent, of 5 erect, ovate-acuminate sepals. Corolla persistent, campanulate, limb 5-lobed. Sta. 10, anthers awnless, opening by pores at apex. Style thick, stig. large, 5-angled, caps. 5-celled, 5-valved. Seeds numerous, minute. Plant leafless, brownish. Flowers subsessile, capitate, reddish-white, with the odor of the violet.

S. odoràta Ell.—Woods, Md. to Car. 3—5′. Habit of Monotropa. February, March.

33. PTERÓSPORA, Nutt. ALBANY BEECH-DROPS. Calyx 5-parted. Cor. urceolate, roundish-ovoid, the limb 5-toothed and reflexed. Sta. 10, anthers peltate, 2-celled, 2-awned, opening lengthwise. Caps. 5-celled, 5-valved. Seeds very numerous, minute, winged at the apex. ♃ Leafless, brownish-red, simple, viscid-woolly. Fls. racemed, white.

P. Andromedèa Nutt.—Near Albany, N. Y. (A. Stores), N. and W.: rare. 12—30′. Rac. erect, loose, with 40 or more drooping fls. resembling those of Andromeda. Jl.

ORDER LXXIV. AQUIFOLIACEÆ. HOLLYWORTS.

Shrubs or *trees*, with simple, coriaceous, exstipulate leaves. *Flowers* small, axillary, sometimes diœcious. *Sepals* 4—6, imbricate in bud, very minute. *Corolla* regular, 4–6-cleft or parted, hypogynous, imbricate in æstivation. *Stamens* inserted into the very short tube of the corolla and alternate with its segments. *Anthers* adnate. *Ovaries* free from the calyx, 2–6-celled, with a solitary, suspended ovule in each cell. *Fruit* drupaceous, with 2—6 stones or nucules. *Albumen* large, fleshy.

§ Habitually tetramerous. Drupe with 4, bony, sulcate nutlets........................ILEX. 1
§ Habitually tetramerous. Drupe with 4, horny, smooth nutlets........................NEMOPANTHES. 2
§ Habitually hexamerous. Berry with 6 (7, 8) smooth, cartilaginous seeds............PRINOS. 3

1. ILEX, L. HOLLY. Fls. 4- (rarely 5-) parted, mostly perfect, but many abortive. Calyx 4-toothed, persistent. Pet. 4, distinct or scarcely united at base. Sta. 4. Stig. 4, or united into one. Drupe red, with 4 bony nutlets, ribbed and furrowed on the convex back. ♄ ♄ ♄ Leaves alternate. Flowers small, white, lateral, single or clustered.

* Trees evergreen. Leaves armed with spinous teeth..........................No. 1
* Shrubs evergreen. Leaves unarmed, serrate or entire ....Nos. 2—4
* Shrubs deciduous. Lvs. thin.—*a* Pedicels short as the petioles..........Nos. 5, 6
—*a* Ped. (the sterile) longer than petioles......No. 7

1 **I. opàca** Ait. Lvs. thick, smooth, oval, spinescent at apex, and with remote, repand, spinescent teeth; drupe ovoid, nutlets 5-ribbed on the back. Woods, Mass. to Ga. and La. 15—30f. A beautiful evergreen. June.

β. ***integra.*** Lvs. entire, only a few of them 1-3-toothed. Tree, S.

2 **I. Dahoon** Walt. Downy, more or less; lvs. 2—3′, oblong to oblanceolate, thick, shining above, pale beneath, entire, acute or obtuse; sterile ped. ∞-flowered, fertile few-flowered; nutlets 3-ribbed. Swamps, Va., and S. 5—12f. May.

β. ***ligustrina*** has narrow, wedge-lanceolate, acute, subserrate leaves. South.

3 **I. myrtifòlia** Walt. Nearly smooth; lvs. very small (5—9″), oblong-linear, thick, serrulate when young, subsessile; pedicels 1-9-flowered. Pine-barren ponds, Md. to Fla. 12—20f. Stems straggling, light gray. Very unlike No. 2. May.

4 **I. Cassèna** Walt. *Cassena Tea.* Smooth; lvs. small (10—18″), elliptical, obtuse, crenate, thick, shining; ped. about 3-flowered. Coastward, S.: common. 6—15f, bushy. March, April. Was used as a tea by the Creek Indians.

5 **I. decídua** Walt. Nearly smooth; lvs. thin, 1—2′, lance-oval, pointed, blunt-serrate; ped. short as the petioles, the ♂ clustered; seeds obtusely ribbed. S. 6—9f.

β. ***urbàna.*** Lvs. 2—3′, oval, obtuse, tapering to the base. Ill., and S. May.

6 **I. Amelánchier** Curt. Leaves (variable) ovate, oblong to lanceolate, acute or pointed, serrulate, thin, downy beneath; ped. short as the petioles, ♂ clustered, ♀ solitary; drupe red. Hills and mts., N. Y. to S. Car. (Prinos ambiguus Ph.)

β. ***monticola.*** Lvs. large (3—5′), glabrous, the short ped. and cal. some downy.

7 **I. ambígua** Chapm. Lvs. oval or elliptical, acute (scarcely pointed), serrulate or nearly entire, smoothish; ♂ ped. much longer than the pet., clustered, ♀ short, solitary. Wet grounds, S. 4—8f. March, April. (Prinos ambiguus Mx.)

2. **NEMOPÁNTHES,** Raf. Parts of the flower in 4's or 5's. Calyx very small. Petals linear-oblong, shorter than the stamens. Stig. sessile Drupe globular, red, with 4, rarely 5, smooth, horny nutlets (seeds). ♄ Lvs. entire, smooth, thin. Fls. white, small, on slender pedicels, ♂ ♀ ☿.

N. Canadénsis DC.—N. Eng. to Mich. Shrub 4—6f. Lvs. 2′. Ped. 9—12′. May, Jn.

3. **PRINOS,** L. WINTER-BERRY. Fls. small, habitually 6-parted and perfect, but often fruitless. Calyx 6-cleft. Cor. monopetalous, subrotate, 6-parted. Sta. 6 (in the sterile flowers rarely fewer, in the fertile rarely more). Berry 6-seeded, seeds with a smooth, cartilaginous testa. ♄ ♄ With alternate lvs., small white fls., and red or black berries.

§ Leaves deciduous, thin. Berries red................................Nos. 1—3
§ Leaves evergreen, thick, shining. Berries black..........................Nos. 4, 5

1 **P. verticillàtus** L. *Black Alder.* Lvs. oblanceolate or elliptical, acuminate, mucronate-serrate, small; pedicels shorter than the petioles; berries scarlet, in close bunches as if verticillate, all Winter. Low woods. 8f. Leaves 1—1½′. July.

2 **P. lanceolàtus** Ph. Lvs. lanceolate, long-acuminate, sharp-serrate, glab., 1—3′; fls. subsessile, the sterile 3-androus; berries large, red. Swamps, S. (Dr. J. Hale.)

3 **P. lævigàtus** Ph. Leaves lanceolate, appressed-serrulate, glabrous, shining above, short-acuminate; ped. longer than the pet., in 2's or 3's. Swamps, Can. to Va. 7f. Jn.

4 **P. glaber** L. *Ink Berry.* Lvs. coriaceous, cuneate-lanceolate, glabrous, serrate at the end; ped. longer than the pet., 1-3-flowered. Swamps, Ms. to La. 3—4f. Jn., Jl.

5 **P. coriàceus** Ph. Lvs. thick, obovate, serrate at the end, glabrous, shining; fls. all solitary, on very short peduncles, 6-8-parted. Woods, S. 4—6f. Lvs. 2′. May.

ORDER LXXVI. STYRACACEÆ.

Trees or *shrubs* with alternate, simple leaves, destitute of stipules. *Flowers* or *racemes* solitary, axillary, bracteate. *Calyx* 5-, rarely 4-lobed. *Corolla* 5-, rarely 4- or 6-lobed, imbricated in bud. *Stamens* definite or ∞, unequal in length, usually cohering. *Anthers* innate, 2-celled. *Ovaries* adherent, 2–5-celled, the partitions sometimes hardly reaching the centre. *Fruit* drupaceous, generally with but one fertile cell. *Seeds* 5—1.

TRIBE I. SYMPLOCINEÆ. Calyx 5-cleft. Anth. ∞, innate, globular. Fls. yellow.....SYMPLOCOS. 1
TRIBE II. STYRACEÆ. Calyx mostly truncate. Anthers 8—12, linear-oblong, adnate.
Flowers white,—*a* 5-parted. Fruit wingless, 1-seeded........................STYRAX. 2
—*a* 4-parted. Fruit winged, 2- or 3-seeded......................HALESIA. 3

1. **SÝMPLOCOS,** Jacq. Cal. 5-cleft. Cor. 5-parted, spreading. Sta. ∞, in 5 clusters, one attached to the base of each petal. Fil. slender. Anth. globular. Ovary 3-celled, half-adherent. Drupe dry, with a 3-celled, mostly 1-seeded nut. ♄ ♄ With clusters or racemes of small yellow flowers.

S. tinctòria L'Her. Lvs. oval or elliptical, acuminate, acute at base, thick; fls. sessile, in axillary, dense clusters of 6—12; calyx lobes ovate, obtuse. Va., and S. 10—20f. Drupe ovoid, 6″. The dried leaves dye yellow. March, April.

2. **STYRAX,** Tourn. Cor. deeply 5-parted, much longer than the campanulate calyx. Sta. 10, joined to the base of the corolla, fil. united into a short tube at base. Anth. linear, erect. Ov. adherent at base. Fr. coriaceous, 1-celled, mostly 1-seeded. ♄ With alternate leaves and axillary racemes of white, drooping, showy flowers. March—May.

1 **S. pulverulénta** Mx. Pulverulent-downy; lvs. broadly oval, obtuse, glandular-serrulate; fls. axillary and terminal. Va. to Fla. 2—3f. Petals 6″.

2 **S. Americàna** Lam. Plant glabrous; lvs. oblong or elliptical, acute at each end; rac. leafy, few-flowered, cor. often downy. Swamps, Va., and S. 4—8f.

3 **S. grandifòlia** Ait. Lvs. ample, broadly obovate, acute or short-acuminate, hoary-tomentous beneath; racemes leafless, longer than the leaves. Va. to Fla. 6—12f.

3. **HALÈSIA,** Ellis. SNOWDROP TREE. Cal. obconic, briefly 4-lobed. Cor. inserted into the calyx, campanulate with a narrow base, 4-parted. Sta. 8—12, connate into a tube below. Sty. filiform. Fr. dry, 2–4-winged. Sds. 1—3. ♄ ♄ Lvs. alternate, abruptly acuminate, finely denticulate or entire. Flowers in advance of the leaves, pendulous, in lateral clusters of 3—5, white, showy.

1 **H. tetráptera** L. Lvs. oblong-ovate; fls. 6″ long; pet. half-united; stam. 12; fr. equally 4-winged. Woods, Va. to Ky., and S. Shrub 10—20f. April.

2 **H. díptera** L. Lvs. oblong-ovate; fls. 1′ long; pet. slightly united; stam. 8; fruit 2-winged. Woods, S. Tree 15—30f, often 50f. Lvs. 6′. Pods near 2′. April, May.

ORDER LXXVII. EBENACEÆ. EBONADS.

Trees or *shrubs* without milky juice and with a heavy wood. *Leaves* alternate, exstipulate, coriaceous, entire. Inflorescence axillary. *Flowers* by abortion diœcious, seldom perfect. *Calyx* free, 3–6-cleft, divisions nearly equal, persistent. *Corolla* regular, 3–6-cleft, often pubescent, imbricate in æstivation. *Stamens* twice or 4 times as many as the lobes of the corolla. *Fruit* a fleshy, oval, or globous berry. *Seeds* large, suspended, albuminous.

DIOSPỲROS, Dalesch. PERSIMMON. Fls. ♂ ♀. Cor. tubular or campanulate, convolute in bud. ♂ Sta. mostly 16. Fil. shorter than the anthers. Style 0. ♀ Sta. mostly 8, without anthers. Style 2–4-cleft. Berry ovoid or globous, 4–12-, mostly 8-celled, cells 1-seeded. ♄ ♄ A large genus, mostly tropical.

D. Virginiàna L. Lvs. elliptic, abruptly acuminate, entire; racemes axillary, 3–1-flowered, pedicels shorter than the flowers; calyx 4-parted; stamens 8. Woods, lat. 42°, and S. 10—30f. Berry large as a plum, sweet after frost.

ORDER LXXVIII. SAPOTACEÆ. SOAPWORTS.

Trees or *shrubs*, mostly with a milky juice, and simple, entire leaves. *Flowers* small, regular, perfect, mostly in axillary clusters. *Calyx* free, persistent. *Corolla* hypogynous, short, *stamens* usually as many as its lobes and opposite to them, inserted into its tube along with one or more rows or appendages. *Anthers* extrorse. *Ovary* 4–12-celled, with a single anatropous ovule in each cell. *Seeds* large. (Included Theophrastaceæ.)

* Corolla 6–8-cleft, with a pair of appendages at each sinus. S. Fla................MIMUSOPS *Sieberi* DC.
* Corolla 5-cleft,—*a* with a single appendage at each sinus. S. Fla..........SIDEROXYLON *pallidum* Jq.
—*a* with a pair of, &c.—*b* Sterile stamens fringed. S. Fla...DIPHOLIS *salicifolia* A. DC.
—*b* Sterile stamens entire............................BUMELIA. 1

BUMÈLIA, Swartz. Cal. 5-parted. Cor. 5-cleft, with a pair of appendages between the lobes. Sta. 5, opposite the lobes, alternate with 5 petaloid, sterile stamens. Ov. 5-celled. Sty. filiform. Drupe ellipsoid, 1-seeded, exalbuminous. ♄ ♄ Wood hard and firm. Lvs. entire, of a firm texture. Fls. aggregated, white or greenish. Our species are all more or less spiny, and with very tough twigs.

* Leaves hairy beneath......Nos. 1, 2. ** Leaves glabrous both sides....Nos. 3, 4

1 **B. tenax** Willd. Silky-ferruginous; lvs. wedge-oblong to obovate, obtuse; clusters 20-35-flwd., with slender pedicels; drupe oval, corrugated. Sands, S. 20—30f. Jn., Jl.

2 **B. lanuginòsa** Pers. Woolly-ferruginous; lvs. oval, acutish, thin; fascicles 6–12-flwd., with short pedicels; drupe globular. Damp. S. Ill., and S. 8—12f. June, Jl.

3 **B. lycioìdes** Gært. Lvs. wedge-elliptical, rather acute; clusters densely 20–30-flwd., ped. shorter than petioles (2–3″). Damp, Ky., and S. 15–25f. Branches virgate. May.

4 **B. reclinàta** Vent. Lvs. obovate, obtuse, small (9—12″); clusters 15–20-flwd.; ped. slender, half as long as the leaf. River banks, S. Car. to Fla. A straggling shrub. Jn., Jl.

ORDER LXXXI. PRIMULACEÆ. PRIMWORTS.

Herbs low, with the leaves mostly radical or mostly opposite. *Flowers* 5- (rarely 4–6-) parted, regular and monopetalous. *Stamens* 5, inserted on the corolla tube and opposite to its lobes. *Ovary* 1-celled, with a free central placenta. *Style* 1. *Stigma* 1. *Capsule* 1-celled, ∞-seeded. *Seeds* with fleshy albumen. Figs. 22, 133, 249.

§ Ovary half-inferior. Capsule opening by valves. Leaves undivided. (Tribe IV.)
§ Ovary superior.—* Capsule opening by valves. Leaves pectinate. (Tribe I.)
—* Capsule opening by valves. Leaves undivided. (Tribe II.)
—* Capsule opening by a lid. Leaves undivided. (Tribe III.)
I. HOTTONIEÆ. Corolla salver-form. Plants floating. Leaves verticillate....HOTTONIA. 1
II. PRIMULEÆ.—*a* Acaulescent.—*b* Corolla limb spreading, tube cylindrical....PRIMULA. 2
—*b* Corolla limb spreading, tube ovoid.........ANDROSACE. 3
—*b* Corolla lobes reflexed.—*c* Stam. exserted...DODECATHEON. 4
—*c* Stam. included...CYCLAMEN. 5
—*a* Caulescent.—*d* Corolla wanting. Leaves opposite..........GLAUX. 6
—*d* Corolla 7-parted. Leaves in one whorl......TRIENTALIS. 7
—*d* Cor. 5- or 6-parted. Lvs. opp. or whorled....LYSIMACHIA. 8
III. ANAGALLIDEÆ,—*e* Flowers 5-parted, scarlet. Leaves opposite...........ANAGALLIS. 9
—*e* Flowers 4-parted, white? Leaves scattered..........CENTUNCULUS. 10
IV. SAMOLEÆ. Flowers 5-parted. Leaves alternate.............................SAMOLUS. 11

1. **HOTTÒNIA**, L. WATER-FEATHER. Calyx 5-parted. Cor. salver-form, with a short tube, and a flat, 5-lobed limb. Sta. inserted in the tube of the corolla, included. Stig. globous. Caps. globous-acuminate. ≋ ♃ Fleshy, with pectinate-pinnatifid, submersed, radical leaves.

H. inflàta Ell. St. immersed, with a whorl of lvs. (1–2′) at or near the surface; scapes clustered, jointed, hollow, 3—10′, bearing several whorls of small white fls. Pools, N. and S. April—June. Curious.

2. **PRÍMULA**, L. PRIMROSE. AURICULA. Cal. angular, 5-cleft. Cor. salver-shaped or often rather funnel-shaped, with 5 entire or notched or bifid lobes. Sta. included, fil. very short. Caps. ovoid, 5-valved, valves often bifid, opening at the top, ∞-seeded.—Herbs with the leaves all radical and flowers in an involucrate umbel, often showy.

* Native, wild species. Corolla salver-form, the lobes abruptly spreading...Nos. 1, 2
* Exotic.—*a* Corolla salver-form, the lobes abruptly spreading.... ....Nos. 3, 4
—*a* Corolla funnel-form.—*b* Leaves rugous, hairy, toothed..........Nos. 5, 6
—*b* Leaves plain, smooth, often entire.....Nos. 7, 8

1 **P. Mistassínica** Mx. Lvs. spatulate, dent-crenate, green both sides; invol. 1–8-flwd., ⅓ as long as pedicels; cor. lobes obcordate, tube much exserted. Lake shores, Vt. (Willoughby) N. Y. (Seneca), and N. 3—7′. Fls. 5″ broad, white. Jn. Delicate.

2 **P. farinòsa** L. *Bird's-eye P.* Lvs. lance-elliptic, obtuse, dentic. at apex, whitish-mealy beneath, as well as the 3-20-flwd. invol.; cor. pale-purple, with a yellow centre, its lobes bifid. Lake shores, Mich., Me. (A. H. Smith), and N. 6—12′. June, July.

3 **P.** GRANDIFLÒRA. *Common P.* Lvs. obovate-oblong; umb. radical; cor. limb flat, yellow, varying to all shades of orange, and red, to white, single or double. Europe.

4 **P.** PURPÙREA. Lvs. lanceolate, obtuse, yellowish-mealy beneath; scape longer than the leaves; invol. ∞-flwd., as long as the pedicels; lobes entire, dark-purple. Nepal.

5 **P.** OFFICINÀLIS. *Cowslip P.* Lvs. oblong, hairy beneath; fls. all nodding; cal. angular; cor. concave. Endless varieties are raised from the seed. Europe. (P. veris.)

6 **P.** ELÀTIOR. *Ox-lip P.* Lvs. hairy both sides; outer fls. nodding; cor. flat. Eur. 1f. Yel.

7 **P.** AURÍCULA. Lvs. obovate, fleshy; scape ∞-flowered, as long as the leaves; bracts short; calyx powdery. Alps. The varieties are innumerable and beautiful.

8 **P.** CALYCÌNA. Leaves lanceolate, entire, acute, edged with white; invol. 3-5-flwd., as long as the pedicels; cal. tube inflated; corolla lobes emarginate. Austria. Purple.

3. **ANDRÓSACE**, Tourn. Cal. 5-cleft or toothed. Cor. funnel-form or salver-form, the 5 lobes entire, tube constricted at the throat, ovate, shorter than the calyx. Fil. and style very short. Caps. globous. Minute cæspitous herbs, with radical, rosulate leaves.

A. occidentàlis Ph. Lvs. oblong-spatulate and ovate, entire, glabrous; scape ∞-flowered; bracts oval, pedicels slender; calyx angular, segments longer than the small white corolla. ① Gravelly shores, Ill., and W. 1—3′.

4. **DODECÁTHEON**, L. AMERICAN COWSLIP. PRIDE OF OHIO. Cal. 5-parted, reflexed. Cor. tube very short, limb 5-parted, segm. reflexed. Sta. 5, inserted into the throat of the corolla. Fil. very short. Anth. large, acute, connivent at apex. Style exserted. Caps. oblong-ovoid, 5-valved, ∞-seeded. ♃ Root fibrous, with radical, oblong leaves, an erect, simple scape, and a terminal umbel of nodding white flowers and erect fruit.

D. Meàdia L.—Ohio, Penn. to Cal.! common in prairies. Whole plant glabrous, 1—2f; scape 9–20-flowered, usually about 12 flowered. Singularly elegant. May, June.

5. CÝCLAMEN, L. Cal. bell-shaped, 5-parted. Corolla tube ovate, short, limb 5-parted, reflexed. Anth. 5, included, sessile. Caps. globous, 5-valved.—Oriental herbs. Root a large tuber. Leaves all radical, ovate or roundish, cordate. Scapes naked, erect, with one nodding flower, but in fruit coiling up and hiding the capsule in the ground.

1 **C.** EUROPÆUM. Lvs. crenate; petals lance-ovate, fragrant, roseate. Europe.
2 **C.** CÒUM. Lvs. entire; petals round-ovate, inodorous, purple. Asia Minor.

6. GLAUX, L. BLACK SALTWORT. Calyx campanulate, 5-lobed, colored. Corolla none. Sta. 5. Caps. roundish, surrounded by the calyx, 5-valved, 5-seeded. ♃ Maritime, branching, glabrous, with opposite leaves and small, axillary, solitary flowers.

G. marítima L.—Salt marshes, Can. to N. J. Plant fleshy, branching, leafy, 4—6′; lvs. round-ovate, obtuse, entire, darkly glaucous; calyx reddish-white. July.

7. TRIENTÀLIS, L. CHICKWEED-WINTERGREEN. Cal. and cor. 7-(6–8-) parted, spreading. Sta. 7 (6—8). Fruit capsular, somewhat fleshy, ∞-seeded. ♃ St. low, simple. Lvs. subverticillate. Pedicels 1-flowered.

T. Americàna Ph. St. erect, simple, leafless at base; lvs. glomerate at top of the stem, few, narrow-lanceolate, serrulate, acuminate; sepals linear, acuminate. Rocky woods: com. 3—6′. Pedicels 1—4, filiform; corolla white, starlike, 6″. May, June.

8. LYSIMÁCHIA, L. LOOSE-STRIFE. Fls. 5-(rarely 6- or 7-) parted. Cor. wheel-shaped, the petals nearly or quite distinct. Sta. 5, on the base of the corolla. Fil. often somewhat connate or with intervening, sterile ones. Capsules globous, 5–10-valved, opening at the apex. Seeds few or many. ♃ With opposite or verticillate entire leaves. (Flowers yellow.)

§ Petals 5—7, distinct, dotted, with 5—7 intervening teeth. (Naumbergia)........No. 1
§ Petals 5, united at base, that is, monopetalous...(*a*)
  a Sterile filaments 0, the perfect stamens monadelphous...(*c*)
  a Sterile filaments 5 short teeth alternate with the perfect stamens...(*d*)
    c Flowers whorled, in a long, terminal, bracted raceme............Nos. 2, 3
    c Flowers not racemed—axillary or paniculate....................Nos. 4—6
      d Leaves acute at base, tapering to the short petiole.........Nos. 7, 8
      d Leaves rounded or abrupt at base, long-petioled............Nos. 9, 10

1 **L. thyrsiflòra** L. St. simple; lvs. dotted, linear-elliptical, pointed, sessile; thyrsoid racemes from the middle axils pedunculate, shorter than the leaves; pet. linear, brown-dotted. Meadows, N. Eng. to O., and N. 2f. June. (Naumbergia C-B.)

2 **L. stríeta** Ait. Lvs. opposite, rarely in 3's, lanceolate to lance-linear, acute, sessile, dotted; axils producing bulblets after flowering; fls. whorled, in a long, open, terminal raceme, yellow, with purple streaks. Low grounds. 1—2f. July.

β. ***angustifòlia*** (Chapm.) Lvs. very narrow, obtuse; petals acute. South.

3 **L. Herbemónti** Ell. St. simple: lvs. whorled in 4's or 5's, ovate to lance-ovate, pointed, sessile, revolute at edge, dotted; fls. racemed, dotted. Carolina: rare. 2f.

4 **L. Fràseri** Duby. Glandular-downy at top; lvs. opposite, ovate or ovate-cordate, pointed, petiolate, dotted; fls. in a terminal panicle; sep. fringed. S. Car. (Fraser).

5 **L. quadrifòlia** L. Erect, simple; lvs. in whorls of 4's (rarely 5's or 3's), lanceolate, pointed, sessile, dotted; ped. slender, solitary in each axil; pet. oval, obtuse. Damp shades, Can. to Car. and Ky. 18′. Corolla yellow, with purple lines. June.

6 **L. nummulària** L. *Moneywort.* Trailing, weak; lvs. roundish, subcordate, on short petioles, opposite, dotless; fls. solitary, large, showy. Fields and gardens. §

7 **L. longifòlia** Ph. St. slender, flexuous, 4-angled; lvs. linear, shining, revolute at edge; fls. large, in pairs or 4's, terminal on the stem or short branches; petals broad-ovate, erose-dentate; anthers large. Low prairies. W. and S. 1f—20′. July.

β. *ténuis.* Leaves lance-linear, flat, edges not revolute. Miss. and La.

8 **L. hýbrida** Mx. St. strict, angular above; leaves lance-oblong, acute at each end, subsessile, veiny, ciliate at base; ped. solitary, axillary. Meadows. 12—18′. July.

β. *heterophýlla.* Lower lvs. oval or oblong, petiolate; flowers at the summit.

9 **L. ciliàta** L. St. erect, 4-angled; lvs. opposite, ovate to lance-ovate, rounded at base, petioles distinct, *ciliate;* flowers nodding, mostly opposite, in the upper axils, large (1′); stamens distinct. Thickets, along streams. 2—3f. Often branched. Jl.

β. *tonsa.* Pet. entire, destitute of ciliæ; lvs. and fls. smaller. Mts., Ky., Tenn.

10 **L. rádicans** Hook. St. square, long, trailing, *rooting* at the joints; br. slender; lvs. lance-ovate, acute, on long pet.; fls. small (4″). Swamps, Va., and S. 2—4f. Jl.

9. ANAGÁLLIS, L. SCARLET PIMPERNEL. Calyx 5-parted. Cor. rotate, deeply 5-parted, tube 0. Sta. 5, hairy, anth. introrse. Caps. globular, thin, opening all around (pyxis).—Herbs with square stems and opposite or whorled entire leaves. Pedicels axillary, solitary. Fig. 249.

A. arvénsis L. Procumbent; lvs. broad-ovate, sessile, shorter (6—10″) than the curved ped.; sepals lance-linear, as long as the roundish crenate-glandular, red petals. ① Fields, waysides. The flowers (sometimes blue, Dr. Buel) close at 2 P. M., or on the approach of foul weather; hence called the *Poor Man's Weather-glass.*

10. CENTÙNCULUS, L. FALSE PIMPERNEL. Cal. 4-parted. Cor. urceolate-rotate, 4-cleft, shorter than the calyx. Sta. 4, beardless, united at base. Capsules globous, circumscissile. Seeds very minute. ① Very diminutive, with alternate lvs. Fls. axillary, solitary, subsessile, white?

C. mínimus L. St. ascending, branched; leaves subsessile, oval, obtuse, entire, the lower opposite; sep. linear-subulate. Wet, Ill., and S. 1—6′. April—July.

11. SÀMOLUS, L. WATER PIMPERNEL. Calyx partly adherent, 5-cleft. Corolla salver-form, 5-cleft. Sta. 5, alternating with 5 scales (sterile filaments). Caps. dehiscent at top by 5 valves, many-seeded.—Herbs with alternate lvs. Flowers corymbous or racemous. May—Aug. Figs. 22, 133.

1 **S. Valerándi** L. (S. floribundus K.) St. simple or branched; lvs. obtuse, wedge-oval, the lower petiolate; fls. in a raceme or panicle of racemes, pedicels with a minute bract near the middle; petals longer than the sepals. Wet gravels. 6—12′.

2 **S. ebracteàtus** Kunth. Erect, leafy below; lvs. obovate-spatulate; fls. racemed, ped. bractless; cor. white, 3 times longer than the calyx (3″). Marshes. Fla., and W.

ORDER LXXXII. PLANTAGINACEÆ. RIBWORTS.

Herbs rarely shrubby, with radical leaves and the flowers in spikes on scapes. *Flowers* regular, tetramerous. *Stamens* 4—2, alternate with the lobes of the corolla, and inserted on its tube. *Anthers* versatile, *filaments* usually slender and exserted. *Fruit* a membranous pyxis, with 1, 2, or many albuminous seeds.

PLANTÁGO, L. PLANTAIN. RIBWORT. Sep. 4, membranous, persistent. Cor. limb 4-toothed, spreading, persistent on the fruit. Stamens 4 (rarely 2), the long, slender filaments exserted, or in some of the fls. included. Ovary 2-(4-) celled. Pyxis membranous, opening below the middle by a lid, when the loose dissepiment falls out with the seeds.—Herbs acaulescent. Fls. small, whitish, in a slender spike raised on a scape.

§ Flowers uniform; stamens exserted in all of them...(*a*)
§ Flowers dimorphous, the anthers included in most of them...(*b*)
a Seeds 7—16. Leaves broadly ovate, 7-veined. Spike dense..............No. 1
a Seeds 4 only. Leaves oblong or cordate, 3-7-veined.....................Nos. 2, 3
a Seeds 2 only. Leaves lanceolate. Scape tall. May—October........Nos. 4, 5
a Seeds 2 or 4. Leaves linear, fleshy...No. 6
b Corolla lobes permanently spreading. Seeds 2, concave..........Nos. 7, 8
b Corolla lobes closing, and erect on the fruit. Summer..........Nos. 9—11

1 **P. major** L. *Common P.* Leaves ovate, some toothed, smoothish, palmately 7-veined, ample; spikes 1—2f high. ♃ Door-yards: common. Long white elastic fibres are drawn from the veins when the leaf is plucked.

2 **P. Kamptschática** Cham. Leaves elliptic-oblong, obtuse, 3-5-veined; spikes loose-flowered; bracts acute, shorter than the sepals. Ala. (P. Rugelii C-B.)

3 **P. cordàta** Lam. Lvs. ovate, cordate or very abrupt at base, obscurely toothed, subpinnately 5-7-veined; fls. loosely spicate, larger than in No. 1; the bracts ovate, obtuse. ♃ Along streams, Can. Wis., and S. As large as P. major. June, July.

4 **P. lanceolàta** L. Lvs. lanceolate, pointed at each end; scape angular, longer than the leaves; spike dense, ovate or cylindric, brown. ♃ Meadows. 1—2f.

5 **P. sparsiflòra** Mx. Leaves lanceolate or oblong, pointed each way; scape terete, longer than the leaves; spike long, loose, interrupted. S. and S-W. 6—18′.

6 **P. maritìma** L. β. ***juncoides.*** Leaves linear, glabrous, fleshy, nearly as long as the slender scape; spike loose, bracts roundish. Coast, N. J., and N. 4—12′.

7 **P. aristàta** Mx. Lvs. linear, woolly at base, smoothish above; scape longer; spike dense; bracts long, rigid, awn-like (5″); petals round-cordate, spreading, conspicuous; seeds 2, boat-shaped. Prairies, Ill. 6—10′. June, July. (P. Patagonica, β. (Gray.))

8 **P. gnaphaloìdes** L. White-woolly; lvs. oblong to linear; spike dense, exceeding the lvs.; bracts deltoid, not exceeding the calyx. Wis. to Tex. 3—6′. June, Jl.

9 **P. Virgínica** L. Hoary pubescent; lvs. elliptical, 3-5-veined; scapes and spikes elongated, dense-flowered; cor. closed on the pod, erect; seeds rarely more than 2; bracts shorter than the cal. ② Dry hills and rocks, Conn., W. and S. 5—10′. May—Sept.

10 **P. heterophýlla** N. Lvs. linear, entire, or some of them with a few slender teeth; ped. many, as long as the leaves; spikes loose; pod conoid, twice longer than the calyx, crowned with the closed cor., 10-24-seeded. ② Wet, Penn., and S. 4—8′.

11 **P. pusílla** N. Thinly pubescent; lvs. filiform-linear, shorter than the capillary, few-flowered scapes; pod crested, longer than the calyx, 4-seeded. ① Conn. (Mr. Bowles), W. and S. 1—3′. Seeds oblong. May—July.

ORDER LXXXIII. PLUMBAGINACEÆ. LEADWORTS.

Herbs or undershrubs with the leaves alternate or all clustered at the root. *Flowers* regular. *Calyx* tubular, 5-toothed, plaited, persistent. *Corolla* hypocrateriform, of 5 petals united at base, or sometimes almost distinct. *Stamens* 5, hypogynous and opposite the petals, or inserted on their claws. *Ovary* 1-celled, free from the calyx. *Styles* 5 (seldom 3 or 4). *Fruit* a utricle, or dehiscent by valves, containing 1 anatropous seed.

I. STATICEÆ. Styles distinct, at least above. Utricle not valvate. Leaves radical...(*a*)
II. PLUMBAGINEÆ. Style 1, with 5 stigmas. Pod subvalvate. Leaves cauline...(*b*)..PLUMBAGO. 3
a Stigmas filiform. Styles glabrous. Scape branching..............................STATICE. 1
a Stigmas filiform. Styles plumous. Scape capitate..............................ARMERIA. 2

1. STÁTICE, L. MARSH ROSEMARY. Calyx funnel-form, limb scarious, 5-nerved, 5-parted. Pet. scarcely united at base. Fil. 5, adnate to the very base of the corolla. Ovary crowned with the 5 glabrous, filiform styles, utricle opening crosswise. ♃ Herbs with the scape branching, the flowers 3-bracted, sessile on the 3-bracted branchlet.

S. Limònium L. Very smooth. Leaves oblong to oblancelate, acute, tipped with a bristle, long-stalked; scapes terete, corymbous-paniculate; fls. separate or in pairs, on the upper side of the branchlets, blue-purple. Marshes. 6—12′. July—October.

2. ARMÈRIA, Willd. THRIFT. Flowers collected in a dense head. Invol. 3- to many-leaved. Cal. tubular-campanulate, 5-angled, with 5 shallow lobes, scarious and plaited. Pet., sta., etc., as in Statice. ♃ Lvs. radical, mostly linear. Scape simple, appendaged above with a sheath.

1 **A.** VULGÀRIS. Scape terete, smooth; lvs. linear, flat, obtuse; outer bracts of the invol. ovate-acute; fls. rose-colored. Sea-coast, Oreg., &c. 1f. June—August.

2 **A.** LATIFÒLIA. Scape solitary, tall; lvs. broad-oblong, 5–7-veined; flowers rose-red; bracts cusp-pointed, scarious. Portugal. 1—2f. June—August.

3. PLUMBÀGO, Tourn. LEADWORT. Cal. 5-lobed. Corolla salverform, tube longer than calyx, limb twisted in æstivation. Anth. 5, linear. Stig. 5, filiform. Utricle membranous, mucronate with the persistent style. ♄ ♃ Flowers cyanic, numerous through the season.

1 **P.** CAPÉNSIS. Shrubby; lvs. oblong, entire, white-scaly beneath; fls. in short terminal spikes, pale blue, the tube 1′ or more in length. S. Africa. 2—4f. Hardy S.

2 **P.** CŒRÙLEA. Herbaceous; lvs. acuminate; fls. in loose spikes, blue. 6″. ♃ S. Am.

3 **P.** COCCÍNEA. Herb tall; lvs. oblong, large; spikes long, loose; fls. scar. 1—2′. India.

ORDER LXXXIV. LENTIBULACEÆ. BUTTERWORTS.

Herbs small, growing in water or wet places, with showy, bilabiate fls. on scapes. *Calyx* inferior, of 2 or 3 sepals. *Corolla* irregular, bilabiate, personate, spurred. *Stamens* 2, included within the corolla and inserted on its upper lip. *Anthers* 1-celled. *Ovary* 1-celled, with a free, central placenta. *Style* 1. *Stigma* cleft. *Fruit*, capsule many-seeded. *Seeds* minute. *Embryo* straight, with no albumen. Fig. 399.

§ In wet, rocky places. Leaves broad, entire. Corolla throat open……………………PINGUICULA. 1
§ In water, floating. Leaves dissected. Corolla throat closed…………………………UTRICULARIA. 2

1. PINGUÍCULA, L. BUTTERWORT. Cal. 5-parted, somewhat bilabiate. Cor. bilabiate, ringent, upper lip bifid, lower trifid, spurred at base beneath. Sta. 2, very short. Stig. sessile, 2-lobed. Caps. erect. Sds. ∞. ♃ Lvs. radical, rosulate, entire, greasy to the touch. Scapes 1-flowered, nodding. March—May.

* Corollas blue, purple, or white, lobes very unequal……………………Nos. 1—3
* Corollas yellow, the lobes nearly equal………………………………No. 4

1 **P. vulgàris** L. Scape and calyx a little downy; cor. lips very unequal, lobes obtuse, entire; spur cylindrical, straightish. N. Y. (rare), and N. 6—8′. Cor. 1′ long.

2 **P. elàtior** Mx. Lvs. ovate to spatulate; scapes villous near the base; cal. glandu-

lar; corolla lobes obtuse, 2-lobulate; spur half as long as the tube, blunt. S. Car. to Fla. Scape very slender, 8—12′ high. Lvs. 1′ or less. Fls. 1′. (P. australis N.)

3 **P. pùmila** Mx. Lvs. glabrous, roundish-ovate; corolla tube oblong, lobes emarginate; spur acute, nearly as long as tube. Ga., Fla. 2—4′. Fls. 4—5″ long.

4 **P. lùtea** Walt. Lvs. elliptic to obovate; cor. bell-shaped, nearly regular, the lobes sinuate-dentate; spur slender, ⅓ as long as corolla. S. 5—8′. Fls. 9″ broad.

2. UTRICULÀRIA, L. BLADDERWORT. Cal. 2-parted, lips subequal. Cor. irregularly bilabiate, personate, spurred. Stamens 2. Stig. bilabiate. Caps. globular, 1-celled. ≈ Loosely floating, or fixed in the mud. Lvs. radical, multifid or linear and entire, mostly furnished with little inflated *utricles* (whence the name) as buoys. Scape erect. June—Sept. Fig. 399.

§ Floating. Scape involucrate with a whorl of large inflated petioles................No. 1
§ Floating. Scape naked, branches bearing bulblets and bladders...(*a*)
§ Stems creeping and rooting in mud, with few or no air-bladders...(*b*)
a Flowers purple. Branches whorled, submersed..................................No. 2
a Flowers yellow.—*c* Bladders borne on the capillaceous leaves...(*d*)
—*c* Bladders and leaves borne on separate branches.......Nos. 3, 4
d Spur acute or retuse, about as long as the lips.......................Nos. 5—7
d Spur obtuse, short.—*e* Fls. of 2 kinds, the *lipless* down on the stems.....No. 8
—*e* Fls. of 1 kind only, all on the scapes ....Nos. 9—11
b Spur appressed to and scarcely equalling the lower lip of the corolla.....Nos. 12, 13
b Spur remote from the corolla, slender, acute...........................Nos. 14, 15

1 **U. inflàta** Walt. Upper lvs. in a whorl of 5 or 6 at the surface of the water; pet. and midvein inflated, lower lvs. capillaceous, dissected, submerged; scape 4–5-flwd. ♃ In ponds and ditches. Rhizome or stem long. Scape 8′. Fls. 8″ broad, yellow, upper lip rounded, entire, lower lip 3-lobed. August.

2 **U. purpùrea** Walt. Leaves all submersed, fibrillous, whorled on the long stem; scape assurgent, 2–3-flowered; lower lip 3-lobed, bisaccate, longer than the conical spur beneath it. ① Ponds. Scape 3—5′. Flowers 6″ broad, violet-purple.

3 **U. intermèdia** Hayne. Lvs. 2-ranked, crowded, 4—5 times forked, divisions linear-subulate, ciliate-denticulate, rigid, 2—3″ long; bladders all on leafless branches; scape 2–3-flowered; spur conical, acute; corolla 6—8″. ① Pools, Pa., and N. 6—8′.

4 **U. Robbínsii** Wood. Leaves alternate, 3—4 times forked, divisions flaccid, linear-capillary, entire, 8—12″ long; bladders all on leafless branches; scape tall (8—13′), 4–7-flowered; spur fusiform; corolla 4—5″. ① Mass. (Dr. Robbins.)

5 **U. striàta** Le Conte. Lvs. 3–4-furcate, divisions capillary; scape 2–6-flowered, 8—12′; fls. 6″, on slender pedicels, lips subequal, 3-lobed, the upper *striate* with red, concave, the lower as long as the obtuse, notched spur. ① L. I. to Fla.

6 **U. longiróstris** Ell. Lvs. 2–3-furcate, with setaceous segments; scape 1–3-flowered (3—4′); lower lip entire, shorter than the subulate spur. South.

7 **U. biflòra** Lam. Lvs. capillary, root-like, bearing numerous bladders; scape 2—5′, 2-flowered; spur obtuse, notched, equalling the lower lips. W. and S.

8 **U. clandestìna** N. Lvs. capillaceous-multifid, scattered, bladder-bearing; scape slender, 3—4′, 2–3-flwd., seldom seen; cor. 5″, spur shorter than the 6-lobed lower lip; ped. down on the stems 1′, with 1 apetalous flower. ♃ Ponds, Mass. to N. J. and Pa.

9 **U. gibba** L. Minute, with hair-like leaves and few utricles; scape 1–2-flwd., naked (2—3′); corolla spur blunt (*gibbous*) and short, lips many-lobed. ♃ R. I. to Car.

10 **U. vulgàris** L. Lvs. capillaceous-multifid, fibrillous; sc. scaly, 5–12-flwd., 6—12′; spur conical, shorter than the closed lips (3—4″), divergent; fr. nodding. ♃ Ponds.

11 **U. minor** L. Lvs. short, several times forked; sc. 3–6-flwd., 4—7′; cor. ringent, spur blunt, deflexed, much shorter than the obovate, flat lower lip; fr. nodding. ♃.

12 **U. bipartìta** Ell. Lvs. fibrillous-multifid; sc. 1–3-flwd., 2—3′; cal. lower lip 2-*parted;* spur obtuse, half as long as the entire lower lip. Soft mud, South.

13 **U. subulàta** L. Minute, creeping; lvs. few, linear, entire, obtuse; sc. few, 1-5-flwd., 3′, with ovate bracts; spur acute, appressed to the lower 3-lobed lip. Springs.

14 **U. resupinàta** Green. Rooting; lvs. linear-capillaceous, erect, undivided (1′); scapes ∞, simple, 1-flwd., 1-bracted (3—6′); spur ascending, remote from and shorter than the erect lips of the *light-purple* corolla (which is 4″). Muddy shores, N. Eng.

15 **U. cornùta** Mx. Scape rooting, tall (9—12′), scaly, 2-5-flwd.; lvs. fugacious or 0; flowers subsessile, palate very prominent; spur subulate, decurved away from the erect tube and limb. Mud or shallow pools. Flowers large, yellow.

ORDER LXXXV. OROBANCHACEÆ. BROOM-RAPES.

Herbs fleshy, leafless, growing parasitically upon the roots of other plants. *Calyx* 4–5-toothed, inferior, persistent. *Corolla* irregular, persistent, imbricate in æstivation. *Stamens* 4, didynamous. *Anthers* 2-celled, cells distinct, parallel, often bearded, at base. *Ovary* 1-celled, free from the calyx, with 2 or 4 parietal placentæ. *Capsule* enclosed within the withered corolla, 1-celled, 2-valved. *Seeds* very numerous and minute, with albumen.

* Flowers polygamous, on spicate branches, sterile above, fertile below..................EPIPHEGUS. 1
* Flowers perfect,—*a* in one dense spike. Calyx split in front..........................CONOPHOLIS. 2
—*a* in one dense spike. Calyx 5-toothed..........................PHELIPÆA. 3
—*a* solitary on long peduncles or scapes..........................APHYLLON. 4

1. **EPIPHÈGUS**, Nutt. BEECHDROPS. ♂ ☿ ♀ Upper fls. complete, but sterile, with a tubular, curved, 2-lipped cor. barely including the stamens. Lower fls. ♀, with a short, 4-toothed cor. and imperfect stamens. Caps. 2-valved, with 2 placentæ on each valve.—A smooth, dull-red, leafless, branching plant, with sessile flowers all along the branches.

E. Virginiàna Bart.—In beech-woods: common. 1f. Fls. brownish, 5″. Aug., Sept.

2. **CONÓPHOLIS**, Wallroth. SQUAW-ROOT. Fls. ☿, crowded in a thick, scaly spike. Cal. with 2 bractlets at base, 4-toothed, split down in front. Cor. ringent, upper lip arched, notched, lower 3-lobed. Sta. exserted. Caps. 1-celled, 2-valved, with 2 placentæ on each valve.—Stem simple, thick, short, covered with scales, the flowers in the upper axils.

C. Americàna Wal.—In old woods: com. 4–7′ high, and 1′ thick, pale-yellowish. Jl.

3. **PHELIPÆ̀A**, Tourn. BROOM-RAPE. Fls. ☿, spiked or racemed. Cal. 2-bracted at base, 4–5-cleft. Cor. 2-lipped, including the stam. Caps. 1-celled, 2-valved, with 2 placentæ on each valve.—Stem thick, scaly.

P. Ludoviciàna Don. Glandular-pubescent; stem thick, short; spike dense; cal. 5-cleft; cor. funnel-form, lips subequal; bracts ovate, obtuse. Alluvion, Ill.

4. **APHÝLLON**, Mitchell. NAKED BROOM-RAPE. Fls. ☿, solitary, on long, bractless ped. or scapes. Cal. 5-cleft. Cor. tube elongated, curved, limb spreading, subequally 5-lobed. Anthers included. Capsule with 4 placentæ.—Plants glandular-pubescent. Stem nearly subterraneous.

1 **A. uniflòra** T. & G. Ped. *in pairs*, simple, naked, each 1-flwd. Woods and thickets. Ped. 4—5′, scape-like, purplish-yellow, like the nodding flowers. June.

2 **A. fasciculàta** T. & G. Stem 2—3′ high, bearing *many* peduncles from near the summit, each with few scales and 1 purple flower. Mich., and W. 4—6′. May.

ORDER LXXXVI. BIGNONIACEÆ. TRUMPET-FLOWERS.

Trees, shrubs, or *herbs,* often climbing, with opposite, exstipulate leaves, and large, showy, monopetalous, irregular, 5-parted flowers. *Stamens* 2 or 4, often with 1 or 3 sterile rudiments. *Anthers* 2-celled. *Ovary* 2-carpelled. *Style* 1. *Stigma* divided. *Capsule* woody, 2-valved, with few or many large seeds. Figs. 30, 31, 95, 199, 445.

§ Plants woody, with the leaves mostly opposite, and the flat seeds winged...(I.)
§ Plants herbaceous, leaves all simple, some alternate. Seeds wingless...(II.)
I. BIGNONIADS.—Trees, with simple leaves, and long, cylindric pods..............CATALPA. 1
—Shrubs climbing. Leaves compound (binate). Calyx truncate...BIGNONIA. 2
—Shrubs climbing. Leaves pinnate. Calyx 5-toothed..............TECOMA. 3
—Half-shrubby climbers (exotic). Lvs. compd. (bipinnate)...ECCREMOCARPUS. 4
II. SESAMEÆ.—Coarse, clammy herbs, the fleshy pods 2-horned......................MARTYNIA. 5
—Smoothish, erect. Pods dry, 4-celled, not beaked......................SESAMUM. 6

1. CATÁLPA, Scop. CATALPA. Cal. 2-parted. Cor. campanulate, 4- or 5-cleft, the tube inflated. Sta. 2 fertile, 2 or 3 sterile. Stig. 2-lipped. Caps. 2-celled, long, cylindric. ♄ Lvs. opposite or in 3's, simple, petiolate. Flowers in large, showy, terminal panicles, May—July. Figs. 30–1, 445.

1 **C. bignonioìdes** Walt. Lvs. ample, thin, cordate-ovate, lustrous above, downy beneath, long-petioled; fls. in erect, pyramidal panicles, large, irregularly bell-shaped, white, with yellow and violet spots. A beautiful tree 30—50f. Native and cultivated.

2 **C.** KÉMPFERI. Lvs. smaller, entire or lobed, glabrous both sides; fls. smaller. Japan.

2. BIGNÓNIA, Tourn. Cal. margin nearly entire. Cor. somewhat bilabiate, 5-cleft, bell-funnel-shaped. Sta. didynamous, 4 fertile, 1 a sterile filament. Caps. long and narrow, valves flat or scarcely convex, parallel with the partition. ♄ ♄ ♄ Often with tendrils.

1 **B. capreolàta** L. Climbing, smooth; leaves binate, consisting of a pair of evergreen, cordate-lanceolate leaflets and a branching tendril between them; fls. axillary, near 2′, red-yellow; pod 6—7′ long. Woods, S. 50f. Very slender. March—May.

2 **B.** TWEEDIÀNA. With yellow fls. 2′, in panicles; cal. bilabiate. From Buenos Ayres.

3. TECÒMA, Juss. TRUMPET-FLOWER. Cal. campanulate, 5-toothed. Cor. tube short, throat dilated, limb 5-lobed, subequal. Sta. 4, didynamous, with the rudiment of a fifth, anther-cells 2, diverging. Caps. 2-celled, 2-valved, the valves contrary to the partition. Seeds winged. ♄ ♄ ♄ Lvs. opposite, odd-pinnate in the following.

1 **T. rádicans** Juss. Climbing by *radicating* tendrils; lfts. 4 or 5 pairs, ovate, dentate-serrate, pointed; corolla thrice longer than the calyx; stam. included. Woods, thickets, Penn., S. and W. 20—80f. Fls. red, 2′ long. June—Aug. Very showy.

2 **T.** CAPÉNSIS. Climbing; lfts. broad-ovate, crenate-serrate; cor. long, trumpet-shaped, incurved, stam. and style exserted. S. Afr. Flowers corymbed, 2′ long, orange.

3 **T.** GRANDIFLÒRA. Climbing; lfts. lance-ovate, pointed, dent-serrate; cor. scarcely longer than the 5-toothed calyx (3′), scarlet. China and Japan.

4 **T.** JASMINOÌDES. Climbing; lfts. ovate, shining, entire; pan. terminal; cor. trumpet-shaped, white, roseate in the throat. Australia. Common in greenhouses.

4. ECCREMOCÁRPUS, R. & P. Calyx acutely 5-cleft, broader and much shorter than the tubular corolla, whose lobes are 5, rounded, reflexed.

Sta. 4, included. Caps. 1-celled, 2-valved, valves placentiferous in the middle. Half-shrubby climbers, from S. Am. Tender. (Calampelis, Don.)

1 E. SCABER. Lvs. bipinnate; cor. tube inflated above the calyx, scarlet, drooping, 1′.
2 E. LONGIFLÒRA. Lvs. tripinnate; cor. tube cylindric, curved, yellow, 3′, drooping.

5. MARTÝNIA, L. UNICORN PLANT. Cal. 5-cleft, bracteolate at base. Cor. campanulate, tube gibbous at base, limb 5-lobed, unequal. Sta. 5, one rudimentary and sterile, four didynamous. Caps. coriaceous, ligneous, 4-celled, 2-valved, each valve terminating in a long, hooked beak. ① Chiefly southern, branching, viscid-hairy, strong-scented. Flowers large.

1 M. proboscídea Glox. Branches mostly decumbent; lvs. cordate, entire, roundish, villous, upper ones alternate; fls. on long, axillary peduncles; beaks 2 (when the valves separate), hooked; corolla dull yellowish. Fields, thickets, S. and W. 2f. Jn.
2 M. FRÀGRANS. Lvs. roundish-3-lobed, sinuate-dentate; raceme few-flowered; corolla purple, yellow inside, fragrant; beaks shorter than the pod. Mexico.
3 M. LŬTEA, with large yellow funnel-form corollas, is from Brazil.

6. SÉSAMUM, L. OIL-SEED. Cal. 5-parted. Cor. campanulate, 3-cleft, the lower lobes the longest. Sta. 4, didynamous. Stig. lanceolate. Caps. 2-celled, the cells divided by the inflexed edges of the valves. ① E. India. Leaves petiolate, the lower opposite, upper alternate.

S. Indicum DC. Lvs. lance-ovate, lower ones 3-lobed, upper ones undivided, serrate; flowers axillary, sessile, pale purple. Fields and gardens. Seeds rich in oil. §

ORDER LXXXVII. GESNERIACEÆ. GESNERWORTS.

Tropical plants, somewhat fleshy, with opposite or radical leaves, no stipules, and showy, somewhat irregular flowers. *Calyx* half adherent to the ovary (in the following genera), 5-parted. *Corolla* tubular, 5-lobed, imbricated in bud. *Stamens* 2 or 4, didynamous, with a rudiment. *Style* 1. *Fruit* a capsule nearly free, 1-celled, with 2 double, many-seeded placentæ.

Corolla tube bell-form, equally tumid at base, limb oblique	GESNERIA.	1
Corolla bell-funnel-form, gibbous at base, limb short	GLOXINIA.	2
Corolla salver-form, subequal, limb flat-spreading	ACHIMENES.	3

1. GESNÈRIA, L. ♃ With tuberous roots and toothed leaves. Sta. 4, with a rudiment, anthers cohering at first. Brazil.

1 G. LÍNDLEYI. Lvs. opposite, ovate-oblong, rugous; flowers in a terminal raceme; corolla 18″, scarlet or red, the limb very short. Brazil.
2 G. DOUGLASII. Leaves whorled, ovate, pubescent, with the numerous red-yellow flowers in their axils.—The species are many and much mixed.

2. GLOXÍNIA, L'Her. Has often radical leaves (or with very short stems), crenate, and large axillary or radical flowers. Stamens 4, with a fifth rudiment, anthers cohering. Brazil.

G. SPECIÒSA. Leaves oval-oblong, on long radical petioles; ped. subradical, 1-flowered; corolla bell-shaped, 1½′, violet, varying to white.

3. ACHÍMENES, Br. Erect, downy herbs, with scaly buds. Anth. 4, separate, the rudiment on the base of the corolla.

1 A. LONGIFLÒRA. Leaves oblong, pointed at both ends, serrate; corolla violet-purple, 15″; calyx 4—5″, pedicel still shorter, 1-flowered, axillary. Mexico.

2 A. COCCÍNEA. Leaves ovate, acuminate; corolla scarlet, 10″, calyx 5″, the pedicel longer, axillary, erect, with the flower nodding. Jamaica.

ORDER LXXXVIII. SCROPHULARIACEÆ. FIGWORTS.

Herbs chiefly, without fragrance, the leaves and inflorescence various. *Flowers* irregular, 5-parted, didynamous or diandrous (rarely pentandrous). *Calyx* free from the ovary, persistent. *Corolla* monopetalous, imbricated in bud. *Stamens* inserted in the tube of the corolla, 1 or 3 of them usually rudimentary. *Ovary* free, 2-celled, with 1 style, a 2-lobed stigma, and becoming in fruit a 2-celled, ∞-seeded capsule, with axile placentæ and albuminous seeds. Figs. 70, 106, 134, 167, 434, 502.

1 Leaves alternate (or opposite, and the corolla spurred or saccate behind)...(2)
1 Leaves opposite, and the corolla lower lip an inflated sac. (Tribe 2.)
1 Leaves opposite, and the corolla not spurred nor saccate...(5)
  2 Inflorescence compound, centrifugal or terminal. Exotics. Tribe 1...(*x*)
  2 Inflorescence simple, centripetal or axillary...(3)
    3 Stamens 5. Corolla large, rotate, more or less irregular. Tribe 3...(*a*)
    3 Stamens 4 or 2. Corolla minute, 4- or 5-lobed. Little herbs. Tribe 7...(*k*)
    3 Stamens 4. Corolla large, upper lip exterior in the bud. Tribe 4...(*b*)
    3 Stamens 4 or 2. Corolla lower lip exterior in the bud...(4)
      4 Corolla bell- or thimble-shaped, oblique, lobes spreading. Tribe 8...(*m*)
      4 Corolla bilabiate, upper lip vaulted and arched. Tribe 12...(*p*)
  5 Stamens 2, exserted. Corolla rotate or salver-form. (Tribe 9.)
  5 Stamens 2 (rarely 3), included. Corolla tubular, labiate, rotate, &c. Tribe 6...(*e*)
  5 Stamens 4, perfect,—* the 5th a large, conspicuous rudiment. Tribe 5...(*c*)
    —* the 5th a minute rudiment, or none...(8)
    8 Inflorescence compound, in cymes or panicles. Tribe 5...(*d*)
    8 Inflorescence simple.—† Corolla wheel-shaped, largest lobe upward. Tribe 3...(*a*)
      —† Corolla salver-form, lobes about equal. (Tribe 10.)
      —† Corolla bell-shaped, not helmeted. Tribe 11...(*n*)
      —† Corolla bilabiate and helmeted. Tribe 12...(*q*)

I. SALPIGLOSSIDEÆ. (Corolla in bud plicate at the clefts. Inflorescence cymous.)
  TRIBE 1. SALPIGLOSSIEÆ.—*x* Stamens 2. Corolla deeply many-cleft............SCHIZANTHUS. 1
    —*x* Stamens 4.—*y* Corolla tubular-funnel-form........SALPIGLOSSIS. 2
      —*y* Cor. salver-form. Anth. unlike....BROWALLIA. 3
      —*y* Cor. salver-form. Anth. all alike..BRUNFELSIA. 4
II. ANTIRRHINIDEÆ. (Corolla in bud imbricate, the upper lip covering the lower.)
  TRIBE 2. CALCEOLARIEÆ. Flowers in cymes, very showy, cultivated........... CALCEOLARIA. 5
  TRIBE 3. VERBASCEÆ.—*a* Stamens 5, corolla not inverted, subregular............VERBASCUM. 6
    —*a* Stamens 4. Cor. inverted on the twisted pedicels.....ALONSOA. 7
  TRIBE 4. ANTIRRHINEÆ.—*b* Corolla spurred. Pod opens by valves...............NEMESIA. 8
    —*b* Corolla spurred. Pod opens by pores........ ......LINARIA. 9
    —*b* Corolla saccate at base, throat closed................ANTIRRHINUM. 10
    —*b* Corolla throat open, naked inside. Climbers.......MAURANDIA. 11
    —*b* Corolla throat open, with 2 hairy lines. Climbers..LOPHOSPERMUM. 12
  TRIBE 5. CHELONEÆ.—*c* Sterile filament a scale. Flowers small, lurid..........SCROPHULARIA. 13
    —*c* Sterile filament shorter than the rest. Seeds winged...CHELONE. 14
    —*c* Sterile filament equalling the rest. Seeds wingless....PENTSTEMON. 15
    —*d* Herbs. Corolla labiate, blue and white...........COLLINSIA. 16
    —*d* Shrubs slender. Corolla tube straight..............RUSSELLIA. 17
    —*d* Shrubs erect. Corolla tube incurved..............PHYGELIUS. 18
    —*d* Trees. Corolla blue, tubular-bell-form ....PAWLONIA. 19
  TRIBE 6. GRATIOLEÆ.—*e* Calyx 5-angled. Corolla 2-lipped, 5-lobed, large.. ....MIMULUS. 20
    —*e* Calyx 5-angled. Corolla oblique, 4-lobed, large.......TORENIA. 21

—*e* Calyx 5-parted, equal. Leaves many-cleft............CONOBEA. 22
—*e* Calyx 5-parted, unequal. Leaves entire..............HERPESTIS. 23
—*f* Calyx 5-parted. Sterile filament short, or 0.......GRATIOLA. 24
—*f* Calyx 5-parted. Sterile filament exserted.........ILYSANTHES. 25
—*f* Calyx 4-lobed. Stamens 2. Flowers minute.....MICRANTHEMUM. 26
—*f* Calyx 4-lobed. Stamens 3. Flowers small. S...HYDRANTHELIUM. 27
III. RHINANTHIDEÆ. (Corolla in bud imbricate, the lower or lateral lobes exterior.)
TRIBE 7. SIBTHORPEÆ.—*k* Stamens 2. Corolla 4-cleft........................AMPHIANTHUS. 28
—*k* Stamens 4. Corolla 5-cleft........................LIMOSELLA. 29
TRIBE 8. DIGITALEÆ.—*m* Stamens 2. Calyx 4-parted. Flowers small..........SYNTHIRIS. 30
—*m* Stamens 4. Calyx 5-parted. Flowers large..........DIGIATLIS. 31
TRIBE 9. VERONICEÆ.—Stamens divergent. Upper leaves often alternate......VERONICA. 32
TRIBE 10. BUCHNEREÆ.—Stamens approximate by pairs. Upper lvs. altern....BUCHNERA. 33
TRIBE 11. GERARDIEÆ.—*n* Stamens long-exserted. Corolla tubular............MACRANTHERA. 34
—*n* Stamens short.—*o* Cor. yellow, tube short as limb...SEYMERIA. 35
—*o* Corolla yellow, tube elongated....DASYSTOMA. 36
—*o* Cor. purple. Lvs. very slender...GERARDIA. 37
TRIBE 12. EUPHRASIEÆ.—*p* Anther-cells unequal, separated...................CASTILLEJA. 38
—*p* Anther-cells equal.—*r* Calyx 10-ribbed............SCHWALBEA. 39
—*r* Calyx not ribbed.............PEDICULARIS. 40
—*q* Calyx inflated. Seeds many, winged................RHINANTHUS. 41
—*q* Calyx not inflated.—*s* Seeds many, wingless...EUPHRASIA. 42
—*s* Seeds 1—4, oblong.........MELAMPYRUM. 43

1. **SCHIZÁNTHUS,** R. & P. CUT-FLOWER. Cor. irregular, the upper lip 5-cleft, external in æstivation, lower much smaller, 3-parted. Fil. 4, 2 of them sterile. Capsules 2-celled. ① Chili. Leaves pinnatifid, alternate. Cymes supra-axillary.

S. PINNÀTUS. Lvs. once or twice pinnatisected; cor. segm. longer than tube, the middle segm. of the posterior lip 2-lobed and hood-like; stam. exserted. 1—2f. Fls. delicate and handsome, 1′ broad, purple and yellow, with a dark spot in the midst. Aug.—Oct.

2. **SALPIGLÓSSIS,** R. & P. TRUMPET-TONGUE. Corolla obliquely tubular-funnel-form, with an ample throat, lobes all emarginate. Sta. 4, fertile, with a short rudiment. Style trumpet-shaped at apex and incurved. Capsules oblong, valves bifid. ♃ Chili. Resembles Petunia.

S. SINUÀTA. Annual in our gardens, 1—2f, weak, viscid-downy. Leaves elliptic-oblong, sinuate-toothed or pinnatifid. Fls. 1½′ long, very showy, dark-purple, striped, &c.

3. **BROWÁLLIA,** L. Cor. salver-form, with a long tube, and oblique, 5-lobed limb. Anth. of the two posterior stamens halved, sub-1-celled. Lobes of the stigma broad, divaricate. Caps. membranous, valves bifid.—S. American herbs, with alternate, entire leaves and cyanic flowers.

1 **B.** DEMÍSSA (also elata). Leaves petiolate, ovate; lower fls. axillary, upper racemed; calyx hairy; cor. tube 6″, limb 1′, blue or violet, varying to wh. ① 1—2f. Summer.

4. **BRUNFÉLSIA,** Sw. Corolla salver-form, with a long tube, and a broad 5-lobed limb. Sta. 4, all equal. Style incurved at apex, stig. of 2 broad lobes. Caps. coriaceous, valves entire.—S. American shrubs, with alternate, entire leaves and large blue flowers. (Francisea, Pohl.)

1 **B.** HOPEÀNA. Lvs. obovate to ovate; fls. solitary; cor. tube little exceeding the cal., lobes rounded, subequal, violet, blue, or white, 1′ broad. 3f. Much branched.

2 **B.** LATIFÒLIA. Leaves elliptic to oblong; fls. in loose cymes; cor. tube thrice longer than the calyx, and longer than the limb (1′). Leaves 3—5′ long, shining above,

5. **CALCEOLÀRIA,** L. SLIPPER-FLOWER. Calyx 4-parted, valvate in bud. Cor. tube very short, limb 2-lobed, lobes entire, concave or spur-like, the lower inflated. Sta. 2, lateral, with no rudiments. Caps. ovoid-conical, valves bifid.—S. American and New-Zealand herbs or shrubs, with opposite or whorled leaves and very curious flowers, of all colors, endlessly varied in cultivation.

§ Leaves pinnatisect. Anther cells separated, one empty. Annual............ No. 1
§ Leaves ovate to lanceolate. Fls. corymbous. Anth. cells contiguous.....Nos. 2—4

1 C. PINNÀTA. Rough-downy, weak, 1f, the lower lip orbicular, pale-yellow.

2 C. CORYMBÒSA. Erect; lower lip broad-ovate, obtuse, open beyond the middle, ylw.

3 C. CRENATIFLÒRA. Villous; lower lip hanging, large, obovate, 3-furrowed, spotted, ylw.

4 C. INTEGRIFÒLIA. Viscid; lower lip orbicular, little longer than the upper, scarcely contracted at the base; upper lip twice longer than the calyx. Shrub. 2—3f.

6. **VERBÁSCUM,** L. MULLEIN. Cor. rotate, 5-lobed, unequal. Sta. 5, declinate, all perfect. Caps. ovoid-globous, 2-valved. ① Rarely ♃ or suffruticous. Leaves alternate. Flowers in spikes or paniculate racemes. June—August. Fig. 434.

§ Leaves decurrent on the stem. Flowers in a long, thick spike, yellow........No. 1
§ Leaves not decurrent.—*a* Flowers in racemes, white, yellow or purple.....Nos. 2, 3
—*a* Flowers paniculate, white or yellow..............Nos. 4, 5

1 V. Thápsus L. *Common Mullein.* Leaves decurrent, densely tomentous on both sides; rac. spiked, dense; 3 of the sta. downy, 2 of them smooth. ② Fields, waysides. 3—5f. Almost never branched, woolly all over. Flowers numerous. §

2 V. Blattària L. *Moth Mullein.* Lvs. clasping, oblong, smooth, serrate; ped. 1-flwd., solitary, racemous; filaments all bearing violet wool. ① Waste grounds, waysides. 3f. Flowers 1′, white or yellow. Stem often branched.

3 V. PHŒNÍCEUM. Leaves mostly radical, ovate to oblong, petiolate, smooth above, downy beneath; racemes rarely branched; flowers violet to red. ② Eur. 3f.

4 V. Lýchnitis L. *White Mullein.* Whitish tomentous; st. angular; leaves green above, the lower petiolate; fls. in loose fascicles, forming a pyramidal panicle; fil. all white-woolly. ② Sandy fields, N. Y. to Ga.: rare. Flowers pale yellow. § Eur.

5 V. PULVERULÉNTUM. Clothed in cottony, deciduous tomentum; lvs. tomentous both sides, ovate-oblong; fls. numerous, yellow, in a large panicle. ② Eur.

7. **ALÓNSOA,** R. & P. Cor. resupinate by the twisted pedicel, rotate, 5-cleft, lobes very obtuse, unequal. Sta. 4, short, declinate. Caps. obtuse, flattened, septicidal.—S. American, very branching herbs, with opposite leaves, square branches, and terminal racemes of scarlet flowers.

1 A. INCISÆFÒLIA. Leaves lance-ovate, incisely serrate, petiolate; cor. 1′ or less wide, 3—4 times longer than the calyx. ① All Summer. From Chili.

8. **NEMÈSIA,** Vent. Calyx 5-parted. Corolla personate, saccate or spurred behind, upper lip 4-lobed, lower entire. Sta. 4, lower pair circumflexed at base. Caps. compressed, with 2 keeled valves, and winged seeds. ① S. Africa. Lvs. opposite. Fls. solitary and axillary, or racemed.

1 N. VERSÍCOLOR. Lvs. ovate to lanceolate and linear, entire or toothed; cor. lobes oblong, all subequal (4—5″), spur 4″, incurved, acute. 3f. Blue-white.

2 N. FLORIBÚNDA, has ovate leaves, an obtuse spur, and white-yellow flowers.

9. **LINÀRIA,** Juss. TOAD-FLAX. Calyx 5-parted. Corolla personate,

upper lip bifid, reflexed, lower 3-cleft, throat closed by the prominent palate, tube inflated, with a spur behind. Caps. 2-celled, bursting below the summit.—Herbs. Lower leaves generally opposite, upper alternate. Fls. solitary, axillary, often forming terminal, leafy racemes. Fig. 70.

* Stems prostrate, creeping. Leaves broad, reniform or hastate. Eur.. ...Nos. 1, 2
* Stems erect, with narrow leaves, mostly scattered........................Nos. 3—5
* Stems erect, with broad lanceolate leaves, all verticillate.....................No. 6

1 **L. Cymbalària.** Lvs. palmate-veined, reniform, 5–7-lobed, mostly alternate; fls. axillary, small, yellow, spur shorter than tube. ♃ Smooth, delicate.

2 **L. Elàtine** L. Hairy; lvs. feather-veined, hastate, entire, alternate; ped. solitary, long; cor. yellow and purple. ① Fields. 1—2f. Very slender. § Eur. July.

3 **L. Canadènsis** Dumont. Lvs. scattered, erect, linear, obtuse; fls. racemed; st. simple; scions procumbent; fls. blue. ① Fields, waysides. 6—12′. Very slender. Flowers small, in a loose raceme. Spur filiform, long, short, or 0. June—Sept.

4 **L. vulgàris** Mill. *Common Toad-flax.* Leaves linear-lanceolate, crowded; spikes terminal; fls. dense, imbricate; cal. smooth, shorter than the spur. ♃ Meadows, waysides. 1—2f. Very leafy, with showy rac. of yellow and orange fls. Jl., Aug. § Eur.

β. ***Pelòria.*** Corolla with 3—5 spurs, and a regular border of 3—5 lobes, with 5 stamens. Penn. (Dr. Darlington). Poughkeepsie, N. Y. (Mr. W. R. Gerard).

5 **L.** BIPARTÌTA. Erect; lvs. linear, alternate; ped. much longer than the lance-linear, scarious-edged sepals; cor. 8—10″, violet, the palate orange.

6 **L.** TRIORNITHÓPHORUM. *Three Birds.* Smooth, glaucous; leaves in 3's and 4's; fls. whorled, each resembling 3 little birds. ♃ Eur. 2—3f. Curious.

10. **ANTIRRHÌNUM,** L. SNAP-DRAGON. Calyx 5-sepalled. Corolla gibbous (not spurred) at base of tube, throat closed (personate) by the prominent palate, upper lip bifid, reflexed, lower trifid. Sta. 4. Capsules opening by 2 or 3 pores, as in Linaria.—Herbs, European, &c., with the lower leaves opposite, the upper alternate. Flowers axillary, large, racemed above. Fig. 502.

1 **A.** MAJUS. Erect; leaves lanceolate; fls. evidently racemed; sep. hairy, shorter than the cor. tube; cor. pink, purple, or scarlet, mouth yellow. ♃ 18′. Fls. 1′. Summer.

2 **A.** ORÓNTIUM. Low, spreading; lvs. oblong-lanceolate; fls. smaller than in A. majus (6″), the sepals equalling the cor., which is rose or white, with purp. spots. ① Sum.

11. **MAURÁNDIA,** Ort. Calyx 5-parted. Cor. bilabiate, tube scarcely gibbous at base, throat open, with 2 prominent glabrous folds, upper lip of 2 rounded lobes, lower of 3. Sta. 4. Caps. oblique, opening by chinks below the apex. ♃ Mexican, climbing and twining, with large purple flowers all Summer.

1 **M.** ANTIRRHINIFLÒRA. Leaves mostly triangular-hastate; fls. glabrous, 1′, tube some gibbous at base, throat partly closed by the prominent hairy palate. 10f.

2 **M.** SEMPERFLÒRENS. Lvs. cordate-hastate, angular; calyx glabrous; cor. bell-form, not gibbous (throat open), 1½′ long, pale violet or rose-colored. 10f.

3 **M.** BARCLAYÀNA. Leaves broadly triangular-cordate or hastate; calyx clothed with long glandular hairs; cor. near 2′ long, very oblique, purple, throat open. 10f.

12. **LOPHÓSPERMUM,** Don. Corolla tubular-campanulate, limb 5-lobed, subregular, throat open, between two hairy lines. Caps. globular. Seeds winged. Otherwise as in Maurandia. Fig. 106.

1 **L. ERUBÉSCENS.** Lvs. triangular-cordate, dentate-lobed, pubescent; cal. segm. ovate, hirsute; cor. downy, 2½—3′ long, red, with an ample border. 10—20f.

2 **L. SCANDENS.** Lvs. cordate-ovate, pointed, coarse-toothed, smoothish; calyx segm. lance-ovate; cor. glabrous, 2′, scarlet, limb erect-spreading. 10f.

13. **SCROPHULÀRIA,** L. FIGWORT. Calyx in 5 acute segments. Cor. subglobous, limb contracted, sub-bilabiate, lip with an internal, intermediate scale (sterile filament). Capsules 2-celled. Valves with 2 inflated margins.—Herbs or suffruticous, often fœtid. Leaves opposite. Cymes in simple or compound, terminal, thyrsoid panicles. Fig. 167.

S. nodosa L. Glabrous, tall, branching; leaves ovate, oblong, or lanceolate; fls. in loose pedunculate cymes, combined into an oblong panicle; sterile anther a roundish green scale on the dull, olive-colored corolla. ♃ Thickets. 4—6f. July—Oct.

14. **CHELÒNE,** L. TURTLE-HEAD. SNAKE-HEAD. Calyx deeply 5-parted, with 3 bracts at base. Cor. inflated, bilabiate. Sta. 4, woolly, the sterile filament shorter than the rest. Caps. valves entire. Seeds broadly winged. ♃ With opposite leaves and sessile flowers in the upper axils.

1 **C. glabra** L. Smooth; lvs. subsessile, oblong-lanceolate, acuminate, serrate, acute at base; flowers densely spiked. By brooks and in wet places. 2f. Stems simple, in clumps. Flowers 1′ long, white or roseate, with short gaping lips. Aug., Sept.

β. ***purpùrea.*** Lvs. distinctly petiolate, acuminate; flowers rose-purple. West.

2 **C. Lyòni** Ph. Smooth; lvs. ovate, acuminate, petiolate, serrate, the lower cordate; fls. in a dense spike. Mts. of Car. and Ga. 1—2f. Corolla purple, 1½′. July—Sept.

15. **PENTSTÉMON,** L. BEARD-TONGUE. Calyx deeply 5-cleft. Cor. elongated, often ventricous, lower lip 3-lobed, spreading. The fifth filament (tongue) sterile, bearded, longer than the rest or about as long; anth. smooth. Seeds ∞, angular, not margined. ♃ N. American, branching, paniculate. Leaves opposite, the lower petiolate, upper sessile or clasping. Flowers showy, red, violet, blue, or white, in Summer.

* Native E. of the Mississippi River, sometimes cultivated...(*a*)
a Leaves dissected. Corolla bell-shaped, lobes rounded, subequal..........No. 1
a Leaves undivided, serrulate. Sterile filament (tongue) bearded..... ..Nos. 2, 3
a Leaves entire. Tongue puberulent, widened and incurved at the apex....No. 4
* Native W. of the Mississippi, cultivated for ornament...(*b*)
b Leaves incisely pinnatifid. Corolla lobes subequal. Tongue smoothish...No. 5
b Leaves serrate, with pale purple or blue flowers. Tongue bearded....Nos. 6—8
b Leaves entire.—*c* Cor. strongly bilabiate, scarlet. Tongue bearded........No. 9
—*c* Cor. scarcely bilabiate,—*d* scarlet or crimson......Nos. 10—12
—*d* blue or violet..........Nos. 13—15

1 **P. disséctus** Ell. Lvs. pinnately divided into linear segm.; fls. in a loose panicle; cor. with a curved tube, 9—10″, purple; tongue bearded at apex. Dry. Ga. 2f. Jn., Jl.

2 **P. pubéscens** Sol. Pubescent or glabrous; lvs. ovate-oblong to lanceolate; fls. in a loose panicle; cor. tube 7—9″, gradually enlarged upward, pale purple, lower lip with two bearded folds inside, some longer than the upper. Hills and bluffs. 1—2f. †

3 **P. Digitàlis** N. Glabrous; lvs. elliptic to lanceolate, the upper clasping; fls. many, large, corolla tube abruptly enlarged to bell-form, pale blue or purplish, 12—15″ long, throat widely open, beardless. Rich soils, Pa., W. and S. 3f. Leaves 3—6′.

4 **P. grandiflòrus** Fras. Glabrous and glaucous; lvs. oblong-obovate to roundish-ovate, upper clasping, all entire; panicle long, slender; corolla bell-shaped, 15″, limb nearly regular, bluish purple. Ill., Wis., and W. 3f. Handsome. †

5 **P.** RICHARDSÒNI. Smoothish, branching; fls. 1′, violet, in leafy panicles. Oreg. 2f.

6 **P.** OVÀTUS. Puberulent; lvs. cordate-clasping; fls. 9″, numerous, light blue. Oreg. 2f.

7 **P.** COBÆA. Puber., tall; lvs. lance-ovate, clasping; fls. 2′, broad-campanulate. Tex.

8 **P.** CAMPANULÀTUS. Glabrous; lvs. lance-linear to lance-ovate, long-pointed; panicle long, loose, 1-sided; corolla tube inflated, large, bell-shaped. Mexico.

9 **P.** BARBÀTUS. Smooth and glaucous; lvs. oblong to lance-linear; cor. tube long (13″), scarcely dilated upward, lower lip and tongue densely bearded. Mexico. 2—4f.

10 **P.** MURRAYÀNUS. Glaucous; lvs. connate-clasping, upper roundish; cor. 18″, bright red, dilated upward, in a long virgate panicle; tongue smooth. Texas. 3f.

11 **P.** HARTWEGI. Upper lvs. clasping; cor. tubular, 2′, crimson; tongue glab. Mex. 3f.

12 **P.** GLABER. Smooth and glaucous; sts. in bunches, simple; lvs. lanceolate to ovate, entire; flowers 18″, in slender panicles, blue-crimson. Nebraska, and W. 2f.

13 **P.** SPECIÒSUS. Tall; st. lvs. lanceolate, sessile; cor. blue, 18″, mouth ample, tongue filiform, the panicle long, virgate, secund, each cyme with 5—9 fls., very showy. Oreg.

14 **P.** GENTIANOÌDES. Tall; st. lvs. broad-clasping; cor. 16″, violet, mouth ample, tongue glabrous, dilated and retuse at apex, the panicle long, some leafy. Mexico. 3—4f.

15 **P.** CŒRÙLEUS. Low, leafy; lvs. lance., sessile; cor. blue, 8″; tongue bearded. Neb.

16. COLLÍNSIA, Nutt. INNOCENCE. Calyx 5-cleft. Cor. bilabiate, orifice closed, upper lip bifid, lower trifid, with the middle segment carinately saccate and closed over the declinate style and stamens. Caps. with 2 bifid valves. Seeds large, concavo-convex. ① With verticillate or opposite leaves, axillary and terminal flowers, very pretty.

1 **C. verna** N. Lvs. ovate to lanceolate, the cauline cordate-clasping, dentate; verticils 4–6-flwd.; cor. blue and white, twice longer than the calyx, 2 or 3 times shorter than the pedicel. Banks of streams, N. Y., and W. 8—18′, branching. May, June.

2 **C. parviflòra** Doug. Lvs. ovate to lanceolate; verticils 2–6-flwd; cor. blue, little longer than the calyx and little shorter than the pedicels. L. Sup., and W. 6–10′. Jn.

3 **C.** BÍCOLOR. Stem lvs. ovate, crenate, sessile; verticils 6–10-flwd.: calyx hairy, longer than the ped.; cor. 9″, rose-violet and white. California. 2f. Hardy and handsome.

4 **C.** GRANDIFLÒRA has lvs. thickish and all entire, with ∞ large blue-purple fls. Oreg.

17. RUSSÉLLIA, Jacq. Cal. 5-parted. Cor. tubular, limb sub-bilabiate, of 5 short rounded lobes, the 2 upper twin. Sta. 4, the fifth a small rudiment. Caps. subglobous, septicidal, valves bifid. Sds. ∞, mixed with hairs. ♄ Mexican. Lvs. opposite or whorled, often minute or scale-like.

R. JÚNCEA. Very smooth, with long, drooping, rush-like branches; lvs. lanceolate to linear, or scale-like on the branches. Flowers scarlet, 1′, remote in drooping racemes.

18. PHYGÈLIUS, Mey. Cal. 5-parted. Cor. tube long, enlarged above, limb oblique, lobes rounded. Fifth stamen a minute rudiment. Caps. very oblique, with unequal cells. ♄ Caffraria. Leaves opposite. Flowers in a loose panicle of cymes.

P. CAPÉNSIS.—Shrub 2f, smooth and beautiful. Leaves lance-ovate, crenate, petiolate. Flowers pendulous, 1¼′, crimson, yellow within.

19. PAULÓWNIA, Siebold. Calyx deeply 5-cleft, fleshy. Cor. tube long, declinate, enlarged above, limb oblique, with rounded segments. Sta. 4, arched downward, with no rudiment. Caps. acuminate, valves septiferous in the middle. Seeds ∞, winged. ♄ From Japan, with very large cordate, ovate leaves and large blue-purple fragrant panicles.

P. IMPERIÀLIS.—In parks, 40f high. Flower-buds formed in Autumn, opening in the following Spring. Corolla near 2′. Tree of rapid growth and kingly port.

20. MÍMULUS, L. MONKEY-FLOWER. Calyx tubular, 5-angled, 5-toothed. Corolla ringent, the upper lip reflected at the sides, palate of the lower lip prominent. Stig. thick, bifid. Caps. ∞-seeded.—Herbs prostrate or erect, with square stems and opposite lvs. Ped. axillary, solitary, 1-flwd.

§ Leaves pinnate-veined. Flowers blue (wild) or yellow (cultivated)......Nos. 1, 2, 6
§ Leaves palmate-veined. Flowers yellow or scarlet.........................Nos. 3, 4, 5

1 **M. ríngens** L. Lvs. sessile, smooth, lanceolate, acuminate; ped. axillary, longer than the flowers. ♃ A common inhabitant of ditches and mud soils. 2f. Flowers large, (1′), pale blue, yellow-mouthed, appearing in July and August.

2 **M. alàtus** Ait. Leaves petiolate, smooth, ovate, acuminate; ped. shorter than the fls.; st. winged at the 4 corners. ♃ N. Y., W. and S., in muddy places. 2f. Aug.

3 **M. Jamèsii** Torr. Stems diffuse, rooting; leaves subentire, round-reniform, 5–7-veined, the upper as long as the peduncles of the small yellow fls. L. Sup., and W.

4 **M.** LÙTEUS. Lvs. round-ovate, the cauline sessile or clasping, shorter than the peduncles; calyx ovoid, half as long as the broad, large, yellow, spotted flowers. Cal.

5 **M.** CARDINÀLIS. Branching, villous-clammy; leaves ovate, narrowed to the clasping base, shorter than the long ped.; cal. large, inflated; cor. ample, rose-orange. Cal.

6 **M.** MOSCHÀTUS. *Musk Plant.* Decumbent, hairy-viscid; leaves ovate, dentate; cor. tube exceeding the calyx, yellow. Oregon. Smells strongly of musk.

21. TORÈNIA, L. Calyx tubular, with prominent angles, oblique. Cor. ringent, upper lip notched, lower larger, trifid. Sta. 4, arched beneath the upper lip, the longer pair appendaged at base. Stigma double. Capsules included.—Herbs tropical, diffuse, with opp. leaves and racemed fls.

T. ASIÁTICA. Lvs. petiolate, lance-ovate, crenate-dentate; calyx acute at base, ¾′; cor. twice longer, ample, pale purple tipped with violet. 2f+, trailing.

22. CONÒBEA, Aublet. Calyx 5-parted, equal. Upper lip of the corolla 2-lobed, lower lip 3-parted. Fertile sta. 4, anth. approximating by pairs, cells parallel. Caps. round-ovoid, ∞-seeded.—Herbs, with opposite leaves. Peduncles axillary, solitary or in pairs, 1-flowered.

C. multífida Benth. Low, diffusely-branched, puberulent; leaves petiolate, pinnately dissected; segments linear or cuneate, lobed or entire, obtuse; cor. greenish, scarcely exserted (2″), lobes entire. ① Sandy banks of rivers, O. to La. 6—12′. July.

23. HERPÉSTIS, Gært. Calyx unequally 5-parted. Corolla subbilabiate, upper lip emarginate or 2-lobed, lower 3-lobed. Sta. 4, fertile. Caps. 2-furrowed, valves parallel with the dissepiment. Seeds ∞, small. ♃ Obscure weeds with opposite leaves. Peduncles 1-flowered, axillary, or subracemous, often with two bractlets near the calyx.

§ Leaves feather-veined, or obscurely 1–3-veined. Cor. yellow, or bluish.....Nos. 1, 2
§ Leaves palmately many-(5–9-)veined, subentire. Corolla blue..............Nos. 3, 4

1 **H. nigréscens** Benth. Erect; st. square, branched; leaves oblanceolate, crenate-serrate above; ped. equalling or exceeding the leaves; corolla yellowish, upper lip rounded, entire. Wet pl., S. 1—2f. Cor. rather longer (5″) than cal. Blackens in drying.

2 **H. Monnièra** Humb. Prostrate, fleshy; lvs. wedge-obovate, subentire; ped. as long (9″) as the lvs.; fls. few, bluish; cor. 4″ wide, nearly regular. Wet banks, Pa., & S.

3 **H. amplexicaùlis** Ph. Stem submersed, woolly; leaves ovate, cordate-clasping,

obscurely crenate, obtuse; ped. shorter than the calyx, cor. ⅓ longer, the upper lip emarginate; disk 10-toothed. Swamps, N. J., and S. 6—12′. August.

4 **H. rotundifòlia** Ph. Creeping, smooth; lvs. round-obovate, entire; ped. 2 or 3 times longer than cal.; cor. upper lip notched. Pools, Ill. to La. 1f. Fls. 5″. Aug.

24. GRATÌOLA. HEDGE HYSSOP. Calyx 5-parted, subequal. Cor. upper lip entire or slightly bifid, lower trifid, the palate not prominent. Sta. 2, fertile, mostly with 3 sterile filaments. Capsules 2-celled, 4-valved, valves inflexed at margin. ♃ Low, with opposite leaves. Peduncles axillary, 1-flowered, usually bibracteolate near the calyx.

§ Flowers sessile. Cells of anthers vertical. Plants rigid, bristly-hairy.....Nos. 7, 8
§ Flowers pedunculate. Anther cells transverse. Plants smooth or viscid...(*a*)
  a Sterile filaments none, or very minute and pointed....................Nos. 1—3
  a Sterile filaments thread-like, tipped with a small head................Nos. 4—6

1 **G. Virginiàna** L. St. ascending, branched; leaves lanceolate, sparingly toothed; ped. as long or longer than the lvs.; cor. twice longer than the cal.; sterile fil. none. ♃ Common. 4—8′. St. terete, branching, with white or pale-yellow flowers. July.

2 **G. Floridàna** Nutt. St. erect, branched; lvs. lanceolate, few-toothed; ped. longer than the leaves; cor. 4 times longer than the calyx (7″), yellow. ② Fields, S. 6—9′.

3 **G. sphærocárpa** Ell. Ascending, branched; leaves lance-ovate, attenuate to the base, sparingly toothed; ped. scarcely longer than the cal. Damp. 3—7′. W. and S.

4 **G. aùrea** Muhl. Smooth; lvs. oblong-lanceolate, subentire, clasping; ped. as long as or longer than the leaves; cor. golden yellow. Muddy soils. 6—8′. August.

5 **G. viscòsa** Schw. Viscid-downy; leaves lance-ovate, sharp-serrate, clasping; ped. longer than the leaves; corolla white, twice longer than calyx, which is 2 or 3 times longer than the capsule. Wet places, Ky. to N. Car., and S. 9—12′. (G. Drummondii.)

6 **G. ramòsa** Walt. St. terete, creeping at base; leaves linear, acute, with few teeth near the apex; bractlets nearly 0; sep. linear; cor. white. Muddy shores, S. May—Jl.

7 **G. pilòsa** Mx. Erect, hispid; lvs. ovate, few-toothed, clasping, rugous; cor. tube scarcely longer than the calyx, white. Wet, Md., and S. 9—12′. July—September.

8 **G. subulàta** Baldw. Erect, hispid; lvs. linear or lance-linear, margins revolute, entire; cor. tube slender, thrice longer than the calyx. Wet sands, Ga., Fla. Sept.

25. ILYSÁNTHES, Raf. Cal. 5-parted. Cor. upper lip short, erect, bifid, lower lip larger, spreading, trifid. Sta. 2, fertile; 2 sterile fil. forked, one of the divisions tipped with an obtuse gland, the other acute, or rarely with half an anther. Caps. ovate or oblong, about equalling the calyx. ① With opp. lvs. and axillary, 1-flwd. ped., resembling Gratiola in habit.

1 **I. gratioloìdes** Benth. Branching, ascending 3—8′; lvs. oblong, obtuse, subsessile, obscurely dentate; cor. twice longer than the calyx, bluish-white, 4″. A small weed-like herb, in wet places: common. Peduncles 3—6″. July, August.

2 **I. grandiflòra** Benth. Diffusely creeping; lvs. thick, roundish, entire, subclasping; ped. hirsute, 1′, corolla 6″ long, violet-blue. Sandy swamps, Ga. (Nuttall.)

3 **I. refrácta** Benth. Erect, slender; lvs. clustered below, obovate to oblong, entire, the cauline remote, bract-like, linear-subulate; ped. filiform, refracted in fruit; cor. light-blue, 4 times longer than the calyx (5″). Damp pine woods, S. 6—10′. June.

4 **I. saxícola** (Curtis). Stems leafy, clustered; leaves oblong, obtuse, entire, sessile; ped. 3—4 times longer than the leaves (7—9″), refracted in fr.; cor. blue, 4″. S. Aug.

26. MICRÁNTHEMUM, Rich. Cal. 4-toothed or cleft. Cor. upper lip shorter, entire, lower trifid. Sta. 2, fertile, a glandular scale at the base of each, sterile filament none. Style short, apex clavate or spatulate. Caps. 2-valved. ≈ ① Slender, glabrous, with opposite lvs. and minute fls.

M. orbiculàta Mx. Stems creeping and rooting, branches ascending 1—2′; lvs. orbicular to obovate, 3-veined, entire, subsessile; fls. ½″ long, lower lip of cor. longer than the calyx. Brackish mud, Del., and S. (M. micrantha, &c.)

27. **HYDRANTHÈLIUM,** H. B. K. Calyx 4-cleft. Cor. 3-cleft, the upper lobe broader, emarginate. Sta. 3, on the corolla, anth. cells parallel, distinct. Style with two short lobes. Caps. ∞-seeded. ♒ Tropical, with opposite leaves and minute, axillary flowers. Habit of Callitriche.

H. crenàtum Wood. Submersed stems flaccid, bearing the lvs. above; lvs. roundish, glabrous, *crenate*, abrupt at base, 7–9-veined, on flat, veiny petioles; pedicels 3″, reflexed; corolla little exserted, white. Pools, Miss., La. (Dr. Hale).

28. **AMPHIÁNTHUS,** Torr. Calyx 5-parted. Corolla small, funnelform, limb 4-lobed, lower lobe larger. Sta. 2, included, style lightly bifid, lobes acute. Capsule obcordate, compressed, ∞-seeded. ① Minute, with flowers both axillary, and on terminal, 2-bracted peduncles 1′ long.

A. pusíllus Torr.—On wet rocks, Newton Co., Ga. Leaves nearly radical, linear, obtuse; 1—2″ long; flowers minute, white. March, April.

29. **LIMOSÉLLA,** L. MUDWORT. Calyx 5-cleft. Cor. shortly campanulate, 5-cleft, equal. Sta. approximating in pairs. Capsule partly 2-celled, 2-valved, many-seeded. ♒ ① Minute. Scape 1-flowered.

L. tenuifòlia Nutt. Lvs. linear, scarcely distinct from the petiole; scape as long as the leaves; cor. segments oval-oblong, shorter than the cal. Mud, Penn., and N. 1′.

30. **SYNTHỲRIS,** Benth. Calyx 4-parted. Corolla subcampanulate, segments 4, erect-spreading or 0. Sta. 2 (rarely 4), on the cor., exserted, anth. cells parallel, distinct. Caps. compressed, obtuse or emarginate. ♃ N. American, with a thick root. Radical leaves petiolate, cauline bract-like, on the scape-like stem, alternate. Fls. racemed or spicate. May.

S. Houghtoniàna Benth. Hairy; lvs. ovate, subcordate, crenulate, obtuse; stem or scape dense-flwd. above; cor. greenish, as long as the cal. Hills, Mich., and W. 1f.

31. **DIGITÀLIS,** L. FOX-GLOVE. Calyx 5-parted. Cor. campanulate, ventricous, upper lip reflexed, spreading, middle segment of the lower lip broadest. Caps. ovate, 2-celled, 2-valved, with a double dissepiment. ♃ Europe, Asia. Lower leaves crowded, petiolate, upper alternate. Flowers in showy racemes. Poisonous and medicinal. July, August.

§ Corolla light-yellow, tube twice longer than the lower lip..................Nos. 1, 2
§ Corolla purple, white, brown, often spotted, tube inflated and short......Nos. 3—5

1 **D.** GRANDIFLÒRA (or ochroleuca). *Great Yellow F.* Leaves ovate, veiny, serrulate, clasping; racemes downy, loose; corolla 1¼′ long, segments very broad. 4f.

2 **D.** LÙTEA. Plant very smooth, with lance-oblong leaves; raceme smooth, with many flowers, all on one side; corolla 8—10″ long, tube not inflated. 2f.

3 **D.** PURPÙREA. *Purple F.* Lvs. oblong, rugous, petiolate, crenate, large; flowers in a long, 1-sided raceme, thimble-shaped, purple or white, spotted. 2—3f.

4 **D.** FERRUGÍNEA. Leaves very smooth, lance-oblong; corolla rusty-brown, the lower lip densely bearded, its middle segment ovate. 4f.

5 **D.** LANÀTA. Leaves lance-oblong, often woolly; flowers downy or woolly, white or brown; lower segment of the corolla obovate. 2f.

32. **VERÓNICA**, L. SPEEDWELL. Calyx 4-parted. Cor. subrotate, deeply 4-cleft, lower segments mostly narrow. Sta. 2, inserted into the tube, exserted. Caps. flattened, often obcordate, 2-celled, few-seeded.—Our species are herbs. Leaves opposite. Flowers solitary, axillary or in racemes, blue, flesh-colored, or white.

§ Tender shrubs (Australian) with axillary racemes of blue flowers........Nos. 16, 17
§ Herbs tall (European) with opposite lvs. and terminal rac. of blue fls....Nos. 14, 15
§ Herbs tall, with whorled leaves, terminal racemes, and *tubular* flowers.....Nos. 1, 2
§ Herbs low, weak (3—12′). Leaves opposite (at base). Corolla rotate...(*a*)
  a Racemes opposite, axillary. Capsule roundish, emarginate...........Nos. 3, 4
  a Racemes alternate, axillary. Capsule not rounded, very flat...........Nos. 5, 6
  a Racemes terminal, or the flowers axillary and not racemed...(*b*)
    b Floral lvs. like the rest, not longer than the recurved peduncles...Nos. 7—9
    b Floral leaves bract-like, longer than the erect peduncles...(*c*)
      c Perennial. Peduncles equalling or exceeding the calyx.....Nos. 10—11
      c Annual. Peduncles shorter than the calyx or none..........Nos. 12—13

1 **V. Virgínica** L. *Culver's Physic.* Erect, tall, glabrous; lvs. verticillate in 4's, 5's, or 6's, lance-ovate to lance-linear; spikes mostly several, paniculate. ♃ In thickets, Vt., W. and S. 2—5f. Corolla white, with exserted style and stamens. July.

2 **V.** SIBÍRICA. Hardly different from No. 1, but it has blue flowers. Siberia. 3f.

3 **V. Anagállis** L. Glabrous, erect; lvs. sessile, clasping and subcordate, lanceolate, acutish, entire or serrulate; rac. in opposite axils; caps. orbicular, slightly notched. ♃ Brooks and pools. Plant fleshy, 1f. Flowers small, blue-purple. June, July.

4 **V. Americàna** Schw. *Brooklime.* Glabrous, decumbent at base, erect above; lvs. ovate or ovate-oblong, serrate, petiolate, abrupt at base; rac. loose; caps. roundish, turgid, emarginate. ♃ In clear streams. 12—18′, fleshy. Fls. blue. June, July.

5 **V. scutellàta** L. Glabrous, ascending, weak; lvs. linear or lance-linear, sessile, acute, remotely denticulate; rac. very loose; capsule flat, broader than long, cordate at both ends. ♃ Swamps, N. and W. 1f. Fls. flesh-color, rather large. June—Aug.

6 **V. officinàlis** L. Roughish-downy, prostrate, branching; lvs. wedge-oblong, obtuse, serrate, short-petioled; racemes dense, with pale-blue flowers; capsule downy, triangular-obcordate. ♃ Dry fields. 6—12′. May—July. § Europe.

7 **V. Buxbáumii** Tenore. Prostrate, hairy; lvs. roundish-ovate, coarsely crenate-serrate, the floral similar, all on short petioles; ped. longer than the lvs.; caps. triangular-obcordate, broader than long. ② Waste grounds, E.: rare. 7-12′. Cor. blue. § Eu.

8 **V. agréstis** L. *Neckweed.* Hairy, procumbent, diffuse; lvs. cordate-ovate, deeply crenate-serrate, floral similar, all petiolate; ped. as long as the lvs.; caps. roundish, acutely notched, ∞-seeded. ① Fields, E.: rare. 2—8′. Light blue. May—Sept. § Eu.

9 **V. hederæfòlia** L. Prostrate, pilous; lvs. petiolate, cordate, roundish, coarsely 3-5-toothed or lobed, shorter than the ped.; sep. triangular, subcordate, acute, closed in fruit; caps. turgid, 4-seeded. ① Hard soils, E.: rare. Cor. blue. Mar.—May. § Eu.

10 **V. alpìna** L. Branched at base, ascending 1—5′; lvs. roundish-oval to elliptical, very obtuse, toothed or entire, subsessile; *racemes hairy*, densely few-flwd.; capsule obovate, notched. ♃ Summits of White Mts., N. H., and R. Mts. Fls. small, blue.

11 **V. serpyllifòlia** L. Branched below, ascending 3—12′; lvs. oval, obtuse, subcrenate, the lower rounded and petiolate, upper bract-like, oblong, entire; *rac. smoothish*, loose; caps. obcordate, broader than long. ♃ Pastures: com. Cor. blue-wh. May–Aug. §

12 **V. peregrìna** L. Smoothish, ascending; lvs. petiolate, oblong, few-toothed, obtuse, upper obl.-lin., entire; fls. subsessile, whitish; caps. roundish, slightly notched, ∞-seeded. ① Clay soils, fields: com. 4—10′. Plant rather fleshy. May, June.

13 **V. arvénsis** L. *Corn S.* Hairy, branched; lvs. below round-ovate, subcordate, petiolate, crenate, the upper lanceolate; corolla pale blue, pencilled, shorter than the calyx (as in No. 12); caps. obcordate. ① Dry fields: com. 2—6′. May, June. § Eur.

14 V. SPICÀTA. Erect, 1—2f; leaves opposite, lanceolate, petiolate, serrate; racemes mostly solitary; pedicels shorter than the calyx; corollas blue, showy. ♃ Europe.

15 V. PANICULÀTA. Erect, bushy, 1—3f; lvs. opposite and in 3's, lanceolate, acute at base, petiolate; rac. panicled; ped. longer than the calyx. ♃ Many garden varieties, hybrids between this and No. 14, all with handsome blue racemes. Europe.

16 V. SPECIÒSA. Very smooth, shrubby, with oblong-obovate entire lvs., dense short (2′) racemes in the upper axils, and violet-blue flowers, very beautiful. 1—3f.

17 V. SALICIFÒLIA. Smooth (tree-like at home), with lanceolate, acute, entire leaves, dense glandular-downy racemes (3′), and innumerable blue flowers. 2—5f.

33. **BUCHNÉRA,** L. BLUE-HEARTS. Calyx 5-toothed. Cor. salverform, with a slender tube, and flat limb in 5 subequal lobes. Stam. 4, included, with halved (1-celled) anthers. Caps. 2-valved. ♃ Turns blackish in drying. Leaves opposite. Flowers in a terminal spike. June—Aug.

B. Americàna L. Rough-hispid, slender; leaves oblong to linear, few-toothed, obtuse, 3-veined; spike long-stalked, 6-12-flowered; cor. tube 6—7″ long, limb half as long, deep blue. Woods, N. Y., and S. 2—3f, nearly leafless above.

34. **MACRÁNTHERA,** Torr. Calyx lobes 5, long and narrow. Cor. tubular, with an oblique limb, short entire segments, and 4 long exserted subequal stamens. Style long, filiform. Caps. ovate, acuminate. ♃ Tall, with opposite pinnatifid leaves and yellow fls. on long decurved peduncles.

M. fuchsioìdes Torr.—Pine-barrens, Ga., Fla., and W. 2—3f. Lvs. lanceolate in outline, with lanceolate segments. Rac. long, loose, 1-sided. Cal. seg. denticulate, shorter than the corolla (or *entire* and still shorter in β. LECONTII). Sept., Oct.

35. **SEYMÈRIA,** Ph. Calyx deeply 5-cleft. Cor. tube short, dilated, lobes 5, ovate or oblong, entire. Stam. 4, subequal, valves of the capsule loculicidal, entire. Seeds ∞.—Herbs erect, branching. Cauline leaves mostly opposite and incised. Flowers yellow.

§ Tube of the corolla woolly within, incurved, as long as the limb... ....No. 1
§ Tube of the corolla much shorter than the subrotate limb. Leaves small..Nos. 2, 3

1 S. macrophýlla N. Tall, smoothish; lvs. large, pinnatifid, with lance-oblong incised segments, upper serrate or entire. ♃? Woods, W. 4—6f. Cor. 6″. July.

2 S. pectinàta Ph. Viscid-downy, profusely branched; lvs. small (1′ and less), pinnatifid, seg. few, narrow and entire; caps. acute at base. Dry, S. 3f. Aug.—Oct.

3 S. tenuifòlia Ph. Smoothish, much branched; lvs. bipinnatifid, 6″ long, segments and rachis filiform; capsule obtuse at base. Wet, S. 2—3f. Cor. 4″. Aug., Sept.

36. **DASÝSTOMA,** Raf. WOOL-MOUTH. WILD FOXGLOVE. Cal. campanulate, 5-cleft. Cor. tube dilated, longer than the 5 entire lobes, woolly within. Stam. didynamous, scarcely included, woolly, anthers all equal, awned at base. Caps. ovate, acute, 2 valves bearing a septum in the middle. Seeds ∞. ♃ Tall, erect. Lower leaves opposite. Corolla large, yellow. July—Sept. All blacken in drying. (Gerardia, L.)

* Calyx segments entire.—*a* Plants pubescent..............................Nos. 1, 2
—*a* Plants glabrous ....Nos. 3, 4
* Calyx segments toothed or pinnatifid. Plants downy.....................Nos. 5, 6

1 D. flava Wood. Plant pubescent, subsimple; lvs. lance-oblong, entire, or toothed, the lower pinnatifid or incised; cal. lobes oblong, obtuse, shorter than the tube; ped. very short. Woods. 2—4f. A showy herb. Corollas 18″. (G. flava L.)

2 **D. grandiflòra** Wood. Minutely pubescent, branched; lvs. petiolate, lance-ovate, pinnatifid, toothed, or entire; ped. as long as the calyx; cal. tube as long as the lobes (¼′), corolla 2′ long. Wis., Ill. (J. Wolf), and S. (G. grandiflora Benth.)

3 **D. quercifòlia** Benth. Glabrous and glaucous, branched; lvs. petiolate, the lower bipinnatifid, upper lance-oblong; cal. lobes longer than the tube, both as long as the pedicels; corolla 2′. Thickets. 3—5f. Common.

4 **D. integrifòlia** Wood. Glabrous, subsimple; lvs. lanceolate, acute, entire or nearly so; pedicels shorter than the calyx. Woods, Pa., and W. 1—2f. August.

5 **D. pediculària** Benth. Smoothish or downy; lvs. lance-ovate, pinnatifid with toothed segments; pedicels longer than the hairy calyx, whose toothed segments are about as long as its top-shaped tube. Dry woods. 2—3f. Corolla 15″.

6 **D. pectinàta** (Torr.) Very hairy; lvs. lanceolate, pectinate-pinnatifid, seg. toothed; calyx longer than the pedicels, segm. longer than tube. Woods, S. 3f. Corolla 18″.

37. GERÁRDIA, L. Cal. 5-toothed or cleft. Cor. tubular, ventricous or subcampanulate, tube longer than the 5 broad, entire, unequal lobes. Sta. didynamous, in pairs, shorter than the corolla. Caps. obtuse or pointed, ∞-seeded.—American herbs, rarely shrubby. Leaves opposite (except No. 4). Flowers axillary, solitary, purple or rose-color. July—Sept.

§ OTOPHÝLLA. Calyx segments longer than its tube. Two anthers smaller.....No. 1
§ GERÁRDIA *proper.* Calyx segments short, equal. Anthers all equal...(*a*)
a Cor. 2-lipped, upper lip very short, straight. Peduncles slender. S...Nos. 2, 3
a Corolla lobes subequal, all spreading, throat often hairy...(*b*)
b Leaves *all* alternate, filiform. Flowers large, on long peduncles. S....No. 4
b Leaves opposite, rarely the upper alternate and bract-like...(*c*)
c Peduncles equalling or exceeding the small (½-inch) flowers...........Nos. 5—7
c Peduncles much shorter than the flowers.—*d* Lvs. setaceous or none....Nos. 8, 9
—*d* Lvs. linear, 1—2′ long...Nos. 10—12

1 **G. auriculàta** Mx. Erect, subsimple, rough-hairy; lvs. lance-ovate, the upper auriculate at base; fls. nearly sessile, 7″ long. ① Low grounds, Pa. to Car., and W. 2f.

2 **G. Mettaùeri** Wood. Smooth, slender, diffusely branched; lvs. linear-filiform; ped. filiform, many times longer than the calyx; cor. 8″, upper lip vaulted, notched, lower of 3 rounded lobes, tube with spots and 2 yellow stripes within. ① Wet sandy places, Mid. Fla. (Dr. Mettauer, 1855). 1—2f. Lvs. 1′—1″. (G. divaricata Chapm.)

β. ? ***clausa.*** Cor. tube flattened on the back, throat closed by the inflected lip. Fla.

3 **G. nuda** Wood. Smooth, filiform, branched; lvs. (except a few at the base) all reduced to minute bracts scarcely 1″ long; fls. all terminal, small (5″); caps. globous, exceeding the calyx. Middle Fla. (Dr. Mettauer, 1855). (G. filicaulis Chapm.)

4 **G. filifòlia** N. St. terete, much branched; leaves filiform, alternate and fascicled; ped. 1′, much longer than the leaves; cor. smooth, 9″. ② Barrens, Ga., Fla. 2—3f.

5 **G. linifòlia** N. ♃ Stems virgate, clustered at root, smooth; lvs. opposite, erect, linear, 3—1′; ped. 8—12″, cal. 2″, truncate; cor. 1′, spotted. Wet barrens, S. 2—3f.

6 **G. tenuifòlia** Vahl. Smooth, paniculately branched; leaves linear to filiform, 1′, often coiled; ped. as long as the leaves, longer than the flowers, which are 9″ long; calyx teeth very short, acute; capsule globular. Fields and woods. 1f.

7 **G. Skinneriàna** Wood (1848). Roughish; st. virgate, angular, few-branched; lvs. linear, rather obtuse, 1′; ped. axillary, very long (1—2′); cal. 1″, teeth obtuse; cor. small (5″), rose-color, not fringed. Low grounds, W. and S. 1—2f. Unlike all the rest, this species does not blacken in drying. (G. parvifolia, Cham.)

8 **G. setàcea** Walt. (not Benth.) Glabrous, widely branched; lvs. bristle-form, 1′ and less; fls. mostly terminal on the filiform, bracted branchlets, large; ped. 2—4″; cal. 1″, teeth very acute, short; cor. 10″, densely fringed. ① Barrens, Pa., S. and W. 2f.

9 **G. aphýlla** N. Slender, angular, branched above; lvs. minute, setaceous, 1″, or 0; ped. lateral and term., 1—3″; calyx 1″, teeth obtuse; corolla 8″. ① Wet, S. 2—3f.

10 G. marítima Raf. St. angular, with short branches; lvs. linear, fleshy, 6—8″; cor. 7″, some of the lobes fringed; ped. very short; cal. trunc. ① Salt marshes. 4—10′.

11 G. purpŭrea L. St. angular, branched; leaves linear, acute, rough-edged, 1—2′; ped. shorter than the calyx, tube truncate with setaceously acute teeth; corolla large (1′), smooth or downy. ① Low grounds. 1—2—4f. Variable.

12 G. aspèra Doug. St. roughish, branched; lvs. narrowly linear, rough-hispid, 1′; ped. 1—2 times as long as the cal. (3—6″), teeth lance-acute; cor. 1′. ① W. 1—2f.

38. CASTÍLLEJA, L. PAINTED CUP. Calyx tubular, 2–4-cleft. Cor. upper lip linear, very long, arched and keeled, enfolding the didynamous stamens, anth. oblong-linear, with unequal lobes, the exterior fixed by the middle, interior pendulous. ♃ ♄ Leaves alternate, the floral often colored at the apex. Flowers subsessile, in terminal, leafy bracts.

1 C. coccínea Spreng. Lvs. sessile, pinnatifid with linear segments; bracts about 3-cleft, *scarlet* (sometimes *yellow*), exceeding the corolla; cal. 2-cleft, nearly equalling the cor., segments notched. ♃ Wet meadows, E. (rare) and W. 8—12′. May, June.

2 C. sessiliflòra Ph. Hairy-downy; lvs. sessile, clasping, oblong-linear, mostly trifid, *not colored;* calyx sessile, elongated; spikes dense; corolla long, exserted, arched, segments of the lower lip acuminate. ♃ Prairies, N-W. 1f. May.

3 C. pállida Kunth. Lvs. linear, undivided, 3-veined, the upper lanceolate, the floral subovate, subdentate at the end, *whitish;* calyx with acute teeth, shorter than the corolla. ♃ ? White Mountains, Green Mountains, and N-W. 1f. August.

39. SCHWÁLBEA, L. CHAFF-SEED. Calyx tube 10-ribbed, inflated, obliquely 4-cleft, upper division small, lower large, emarginate or 2-toothed. Cor. ringent, upper lip entire, arched, lower 3-lobed. Caps. oblong. Sds. ∞, chaffy. ♃ With alternate leaves and flowers in a terminal spike.

S. Americàna L.—Sandy marshes, N. Y. to Fla. 1—2f, stout, simple, downy. Lvs. lance-ovate, 3-veined, diminishing upward; corolla brown, 1—1½′ long. June.

40. PEDICULÀRIS, L. LOUSEWORT. Calyx inflated, 2–5-cleft, the segments leafy, or sometimes obliquely truncate. Cor. vaulted, upper lip compressed, emarginate, lower lip spreading, 3-lobed. Capsule 2-celled, oblique, mucronate. Seeds angular.—Herbs. Leaves often pinnatifid. Flowers spicate, yellowish.

1 P. Canadénsis L. Hairy, simple; lvs. alternate, petiolate, lance-oblong, pinnatifid with toothed segments; spike short, dense, leafy; cor. abruptly incurved, with 2 setaceous teeth; capsule ensiform-beaked. ♃ Pastures, copses. 1f. May—July.

2 P. lanceolàta Mx. Smoothish, branching; lvs. subopposite, lance-oblong, doubly cut-crenate; spike elongated, loose at base; corolla upper lip larger and covering the lower; capsule short, ovoid. ♃ Shady banks, N. Y. to Va. and Wis. 1—2f. Sept.

41. RHINÁNTHUS, L. YELLOW RATTLE. Calyx 4-toothed, ventricous. Cor. tube cylindrical, as long as the calyx, limb ringent, galea appendaged, compressed, lip broader, deeply divided into 3 obtuse segments. Caps. 2-valved, compressed, obtuse. ① Erect, with opposite leaves.

R. Crista-galli L. Mostly glabrous; lvs. oblong or lanceolate; cor. ⅓ longer than the calyx; appendages of the galea (upper lip) transversely ovate, broader than long; seeds winged, rattling when ripe. Plymouth, Mass., Lake Superior, and N. 1f.

42. EUPHRÀSIA, L. EYEBRIGHT. Calyx 4-cleft. Upper lip of the cor. galeate, concave, apex 2-lobed, the lobes broad and spreading, lower lip spreading, trifid, palate not folded. Sta. unequal, ascending beneath the galea. Capsule oblong, compressed, ∞-seeded.—Herbs with opposite leaves and the flowers in spikes.

E. officinàlis L. Lvs. ovate or oblong, the cauline obtuse, crenate, bracts acute, cut-serrate with cuspidate teeth; calyx lobes subequal; corolla light-blue, lower lobes deeply notched. ① White Mountains, Lake Superior. 2—6′. Leaves 1—3″.

43. **MELAMPỲRUM,** L. COW WHEAT. Calyx 4-cleft. Upper lip of the corolla compressed, the margin folded back, lower lip grooved, trifid. Caps. 2-celled, oblique, opening laterally. Seeds 1—4, cylindric-oblong, smooth.—Herbs with opposite lvs. Fls. solitary in the upper axils.

M. praténse, *β. Americànum* (Benth.) Leaves linear-lanceolate, petiolate, glabrous, the upper broader and toothed at base; fls. axillary, distinct; cal. teeth slender, half as long as the yellowish corolla. ① Woods: common. 6—10′, branched. Jn.—Sept.

ORDER LXXXIX. ACANTHACEÆ. ACANTHADS.

Herbs or *shrubs* with opposite, simple leaves and regular, bracted flowers. *Calyx* 5-parted, equal or unequal, imbricated in the bud. *Corolla* 5-merous, tubular below, limb more or less bilabiate, convolute in bud. *Stamens* didynamous or diandrous, inserted on the tube of the corolla. *Fruit* a 2-celled, 4–12-seeded capsule. *Seeds* supported by hooks or cup-shaped processes of the placentæ, exalbuminous.

§ Seeds destitute of *hooked* supports...(*a*)
  a Corolla regular. Seeds few, resting on little cups. Vines........................THUNBERGIA. 1
  a Corolla bilabiate. Seeds many, with no supports................................ELYTRARIA. 2
§ Seeds resting on hooks proceeding from the placentæ....(*b*)
  b Corolla funnel-form, subregular. Stamens 4, unequal..... ....RUELLIA. 3
  b Corolla bilabiate, ringent. Stamens 4. Pod terete.............................HYGROPHILA. 4
  b Corolla labiate, the upper lip wanting. Stamens 4. † Rare.....................ACANTHUS *mollis*.
  b Corolla bilabiate. Stamens 2.—*c* Corolla inverted, upper lip 3-toothed... ....DICLIPTERA. 5
    —*c* Corolla straight, lower lip 3-lobed.................DIANTHERA. 6
    —*c* Corolla straight, lower lip 3-parted.......... ..CYRTANDRA. 7

1. **THÚNBERGIA,** L. Calyx short, toothed or truncate, with 2 large bractlets at base. Cor. funnel-bell-form, limb 5-lobed, nearly regular. Sta. 4, unequal, included. Caps. beaked, 3–4-seeded. ♄ ♭ Fls. showy, axillary.

T. ALÀTA. A climbing vine, silky-hairy, with cordate-sagittate lvs. on winged pet.; fls. 1½′ deep and broad, purple, with a yellow, buff, orange or white border. E. Africa.

2. **ELYTRÀRIA,** Vahl. Calyx with 4 or 5 unequal segments. Cor. bilabiate, lower lip of 3 bifid segments. Sta. 2 fertile, 2 sterile, included. Caps. 8-seeded.—Herbs acaulescent, with (oblong) leaves at base and clasping bracts on the scapes, and the small flowers in a terminal spike.

E. virgàta Mx. Scapes several, glabrous, covered with the bracts, which are ovate, cuspidate, ciliate, the upper subtending the white flowers; calyx with 2 linear bractlets at base, ciliate. ♃ Wet plains, S. Car. to Fla. 1f. August.

3. **RUÉLLIA,** L. Calyx 5-parted into slender segments. Cor. funnel-form, limb spreading, subequally 5-lobed. Sta. 4, included, didynamous

Caps. narrow. Seeds 4—16, resting on hooks. ♃ Low, with tumid joints, opposite leaves, and showy axillary blue or purple flowers.

§ DIPTERACÁNTHUS. Anthers pointless. Style bifid. Seeds 8—12.........Nos. 1—3
§ CALÓPHANES. Anthers pointed at base. Style simple. Seeds 4. South...(*a*)
a Stems erect from a creeping base, with obtuse leaves..................Nos. 4, 5
a Stems creeping, diffuse, with the leaves entire..........................Nos. 6, 7

1 **R. strèpens** L. Erect, smoothish, with obovate to oblong-petiolate lvs.; ped. very short, 1-4-flowered; bractlets as long as the narrow sepals, little shorter than the slender corolla tube. Dry soils, W. and S. 9—16′. Leaves 2—5′. June, July.

2 **R. ciliòsa** Ph. Erect, white-hairy, with lvs. obovate to oblong, abrupt at base and subsessile; bractlets and sepals not half as long as the tube of the corolla. Rich soils, W. and S. 1f or more. Leaves 1—2′. Flowers 2—2½′. June—September.

β. ***hýbridus.*** Low, decumbent, and very hairy. Georgia (Dr. Feay).

3 **R. tubiflòra** Le Conte. Downy; leaves oblong to lanceolate, sessile; fls. solitary; *sep. lance-linear*, ⅓ as long as the long tube of the white cor. Ga., Fla. June—Aug.

4 **R. oblongifòlia** Mx. Very downy; lvs. obovate to oval, subsessile; fls. 1—3 together, bractlets and sepals as long as tube of the spotted corolla. Dry, Ga., Fla.

5 **R. ripària** (Chapm.) Smoothish, simple; lvs. oblong, petiolate; flowers clustered, small (6″), white, bractlets, sepals, and corolla tube equal. Mid. Fla. 12—18′.

6 **R. humistràta** Mx. Smooth; lvs. oblong-oval, petiolate; flowers 1—3 together, bractlets shorter than the setaceous sepals. Rich soils, S. Car. to Fla.

7 **R. lineàris** T. & G. Small, rough-downy; leaves linear-oblong, imbricated, the bractlets similar; capsule 4-angled, with 2—4 seeds. S. Fla.

4. HYGRÓPHILA, R. Br. Calyx half-5-cleft, with narrow segments. Cor. ringent, lower lip trifid. Sta. 4, unequal, cells of the anth. divergent-sagittate, violet. Stig. subulate. Caps. terete, ∞-seeded. ♃ ≋ Stoloniferous, 4-angled. Flowers clustered in the axils.

H. lacústris Nees. Erect, simple, smooth; leaves lance-oblong, sessile (3—4′); fls. sessile, appearing whorled, white. Borders of lakes. New Orleans. 1—2f.

5. DICLÍPTERA, Juss. Fls. in bracted heads. Cal. 5-parted. Cor. bilabiate, inverted, upper lip 3-toothed, sta. 2, anth. cells equal, one placed above the other. Caps. 4-seeded, the partitions and valves separating. ♃

1 **D. brachiàta** Spr. Smooth; st. 6-angled, brachiately branched; leaves lanceolate, long-petiolate, acuminate; heads few-flowered, the upper approximate, sessile, lower often pedunculate; flowers purple, 5—6″. River banks, S. 1—2f. June—Aug.

2 **D. Hàlei** Riddell. St. downy, mostly simple; leaves lance-ovate, petiolate; bractlets and sepals fringed with long hairs; corolla 5″ long. Fla. to La. 1—2f. Jn.—Aug.

3 **D. assúrgens** Juss., with scarlet (1′) corollas in 1-sided spikes, grows in S. Fla.

6. DIÁNTHERA, Gron. (Rhytiglóssa, Nees, and C-B.) Cal. 5-parted. Cor. bilabiate, upper lip notched, lower 3-lobed. Stamens 2, anth. cells unequal, one placed above the other. Capsule flattened, 4-seeded above the middle. ♃ ≋ Lvs. smooth, entire. Flowers in bracted spikes or heads.

1 **D. Americàna** L. Erect, angular, tall; leaves long-lanceolate, wavy, as long (3—4′) as the peduncles; bracts and sepals lanceolate, 3″, the ringent corolla 6″, violet-purple. Banks, N. Y., W. and S. 2—3f. June, July.

2 **D. ensifórmis** Wood. Erect from a creeping base, slender; leaves linear, oblique or ensiform, thick, shorter (3—4′) than the peduncles; flowers spicate; calyx 6″; corolla purple, 1′. Fla. April. (D. crassifolia Chapm.)

3 **D. ovàta** Walt. St. square, ascending, 4—8′; leaves lance-ovate, acute, longer than the 3-4-flowered peduncles; corolla pale-purple, 3—4″. S. Car. to Fla.

4 **D. hùmilis** Wood. Erect, square, 1—1½f; leaves lance-elliptical, shorter than the ∞ -flowered, 1-sided spikes; corolla 5″, purple. Fla. to La. (Justicia Mx.)

7. **CYRTÁNTHERA,** Nees. Corolla ringent, upper lip falcate, lower in 3 narrow segments. Sta. 2, anth. nodding. Caps. 4-seeded? ♃ Brazil.

C. CARNEA. Stem tall, stout, with ample ovate to oblong leaves, and large, showy, terminal spikes of many flesh-colored flowers. In the greenhouse.

ORDER XC. VERBENACEÆ. VERVAINS.

Herbs (or generally shrubs and trees) with opposite, exstipulate leaves. *Flowers* with a bilabiate or more or less irregular monopetalous corolla. *Stamens* 4, didynamous, rarely equal, sometimes only 2. *Style* 1. *Fruit* dry or drupaceous, 2–4-celled (1-celled in Phryma), forming as many 1-seeded nutlets. *Seeds* erect or pendulous, with little or no albumen.

§ Herbs. Fruit dry, consisting of—
  a 4 one-seeded nutlets. Stamens 4. Corolla 5-lobed..............................VERBENA. 1
  a 2 two-seeded nutlets. Stamens 4. Corolla 5-cleft, minute, spicate. S. Fla......PRIVA *echinàta*.
  a 2 one-seeded nutlets. Stamens 2. Flowers spicate, imbedded. S. Fla...........STACHYTARPHA.
  a 2 one-seeded nutlets. Stamens 4. Corolla 4-parted..........................LIPPIA. 2
  a 1 one-seeded nutlet, reflexed. Stamens 4. Corolla bilabiate......................PHRYMA. 3
§ Shrubs. Fruit fleshy, berry-like (or a 2-celled capsule in No. 7)...(*b*)
  b Leaves compound, digitate. Flowers 5-parted. Seed 1..........................VITEX. 6
  b Leaves simple, toothed.—*c* Cymes axillary. Drupes 4-seeded....................CALLICARPA. 4
    —*c* Heads axillary. Drupes 2-seeded...................LANTANA. 5
  b Leaves simple, entire.—*d* Drupe 2-seeded. Spikes terminal.....................(ALOYSIA.) 2
    —*d* Drupe 4-seeded. S. Fla.........................CITHAREXYLUM *villòsum*.
    —*d* Drupe 8-seeded. S. Fla..............................DURANTA *Plumièri*.
    —*d* Capsule 4-seeded. Flowers in heads..........AVICENNIA *tomentòsa*.

1. **VERBÈNA,** L. VERVAIN. Calyx 5-toothed, with one of the teeth often shorter. Cor. funnel-form, limb somewhat unequally 5-lobed, lobes emarginate. Sta. 4, included, the upper pair sometimes abortive. Drupe splitting into 4, 1-seeded, indehiscent carpels.—Herbs or undershrubs. Leaves opposite. Flowers sessile, mostly in spikes or heads.

§ Corymbed; the open corollas of the spike forming a corymb. Stems weak...(*a*)
  a Leaves 3-cleft or pinnatifid, the lobes cut-serrate or toothed...........Nos. 1—3
  a Leaves merely serrate or toothed, somewhat incised....................Nos. 4—7
§ Spicate; the open corollas lateral, in slender spikes...(*b*)
  b Stem simple (mostly), bearing a single spike. Leaves oblong.........Nos. 8, 9
  b Stem branched, with many spikes.—*c* Leaves mostly simple........Nos. 10—12
    —*c* Leaves much divided........Nos. 13—15

1 **V. Aublètia** L. Lvs. ovate-oblong in outline, 3-parted, cut, acute and petiolate at base; spikes pedunculate; bracts half as long as the cylindrical calyx. Dry soils, Va. to Ill., and S. 1f. Flowers lilac, varying in the gardens to purple. April, May.

2 **V.** INCÌSA. Leaves oblong to deltoid, rugous, cut-lobed and serrate, abrupt at base, petiolate; bracts ovate, a fourth as long as the glandular calyx; corolla rose-purple. ♃ Brazil. Stems some shrubby, ascending.

3 **V.** MULTÍFIDA. Small, creeping, branched; leaves multifid into narrow, acute segments; bracts subulate, shorter than calyx. ① Brazil. Red to white.

4 **V.** VENÒSA. Nearly simple, with rigid, oblong-sessile, cut-serrate leaves; bracts subulate, longer than the calyx, both colored; corolla lilac to blue. ♃ Brazil.

5 **V.** CHAMÆDRIFÒLIA. Leaves oblong-ovate, short-petiolate; bracts subulate, not half the length of the long calyx; corollas scarlet to crimson. ♃ Buenos Ayres.

6 **V.** PHLOGIFLÒRA. With many erect branches, and long-petioled, lance-deltoid leaves; bracts lanceolate, half as long as the calyx. Flowers large, red to blue.

7 **V.** TEUCRIOÌDES has very hairy, wrinkled, ovate-triangular, crenate leaves on short stalks, with large white to roseate sweet-scented flowers. ♃ Brazil.

8 **V. angustifòlia** Mx. Leaves oblong-linear, tapering to base, serrate, with furrowed veins; spikes 1 or few, slender; corolla deep-blue, bracts as long as the calyx (1″). ♃ Rocks and hills, N. Y. to Va., and W. 1f. Leaves 2—3′. July.

9 **V. Caroliniana** L. Leaves oblong-obovate to oblong, crenate-toothed, sessile; spike loose; corolla large, roseate, bracts minute. ♃ Dry soils, S. 1—2f. June.

10 **V. hastàta** L. *Common Vervain.* Lvs. lanceolate, acuminate, cut-serrate, petiolate, the lower lobed or *hastate;* spikes panicled, dense, slender, erect and parallel; flowers blue. ♃ Waysides: common. 3—6f. § Europe. July—September. Hybrids occur, with cleft leaves and loose-flowered spikes.

11 **V. urticæfòlia** L. Leaves ovate to lance-ovate, serrate, acute, petiolate; spikes axillary and terminal, filiform, lax; bracts shorter than the calyx. ♃ A homely weed, in waste grounds. 3f. Flowers minute, white. § Europe. July, August.

12 **V. stricta** Vent. *Mullein V.* Hairy and hoary, rigidly erect; leaves oval to obovate, unequally dentate, sessile, rugous; spikes dense. ♃ Dry fields, W. 1—3f. Very leafy, rather handsome. Corolla blue, 4″ broad. July.

13 **V. bracteòsa** Mx. Hairy, divaricately branched, leaves laciniate; bracts lance-linear, squarrous on the peduncle and spikes, longer than the small blue flowers. ♃ Dry fields, roadsides, N. Y., W. and S. 8—16′. June—September. (V. canescens.)

14 **V. officinàlis** L. Smoothish, erect; leaves lanceolate to oblong, pinnately lobed or toothed, subsessile; spikes slender, panicled; bracts not longer than the calyx; flowers purple, small. ♃ Waysides, Conn. to Ga. 2—3f. (V. spuria L.)

15 **V. strigòsa** Hook. Hoary, rough-downy, rigid; leaves oblong, 3-parted, incised, sessile; spikes strict, lax-flowered bracts long as calyx; corolla large. N. Orl. 2—3f.

2. LÍPPIA, L. FOG-FRUIT. Cal. 2-parted. Cor. funnel-shaped, limb sublabiate, upper limb entire or emarginate, lower 3-lobed. Sta. didynamous, included. Drupe dry, thin, enclosed in the calyx, 2-seeded. ♄ ♃ Leaves opposite or whorled. Flowers small, whitish, in heads or spikes.

1 **L. nodiflòra** Mx. St. 4-angled, geniculate, simple, creeping; lvs. lanceolate to oblanceolate, cuneate at base, petiolate, shorter than the ped. Banks, Pa. to Ill., and S.

2 **L.** (ALOYSIA) CITRIODÒRA. *Lemon Verbena.* Shrub smooth; leaves in 3's, lance-linear, punctate beneath, straight-veined, delightfully fragrant. 3f.

3. PHRYMA, L. LOP-SEED. Cal. cylindric, bilabiate, upper lip longer, 3-cleft, lower lip 2-toothed. Corolla bilabiate, upper lip emarginate, much smaller than the 3-lobed lower one. Stamens included. Fruit dry, oblong, striate, 1-celled, 1-seeded. ♃ With opposite leaves. Flowers opposite, spicate, deflexed in fruit.

P. leptostáchya L.—Rocky woods. 2—3f. Leaves large (3—6′), thin, coarsely-toothed; flowers small, light-purple, in very slender spikes. July.

4. CALLICÁRPA, L. FRENCH MULBERRY. Calyx 4-toothed, bell-shaped. Corolla short-bell-shaped, limb of 4 obtuse segments. Sta. 4, unequal, exserted. Stig. capitate, 2-lobed. Drupe juicy, enclosing 4 nutlets. ♄ With opposite leaves and axillary cymes.

C. Americàna L. Pubescent; lvs. ovate, acuminate at each end, crenate-dentate, smooth above; clusters shorter than the petioles; fruit forming dense verticils. Light soils, S. Shrub much branched, 3—6f, with purple flowers and fruit.

5. LANTÀNA, L. Cal. minute, obsoletely 4-toothed. Corolla funnel-form, the tube long-exserted, limb oblique, upper lip bifid or entire, lower trifid. Sta. 4, didynamous, included. Drupe fleshy, double, the parts separable, 1-seeded. ♄ 3—6f. Tropical, with square stems, opposite petiolate leaves, and capitate, handsome flowers, often fragrant.

* Corollas white or lilac, not becoming yellow or scarlet....................Nos. 1—3
* Corollas white or yellow, changing to saffron, scarlet, crimson, &c........Nos. 4, 5

1 **L.** nívea. Branches with reversed prickles; lvs. ovate to elliptic, crenate-serrate, as long as the peduncles; no involucre; flowers white, turning to blue. Brazil.
2 **L.** Sellowiàna. Branches strigous; lvs. rhombic to oblong, coarse-serrate, shorter than the peduncles; heads some involucrate; flowers reddish lilac. Brazil.
3 **L. involucràta** L. Whitish-downy; lvs. obovate to roundish, crenulate, as long as the peduncles; heads involucrate with the outer ovate bracts, lilac. S. Fla.
4 **L.** mixta. Prickles reversed or 0; lvs. ovate, crenate, abrupt at base, shorter than the peduncles; bracts as long as the corollas, which are white at first, then changing to yellow, then orange, and lastly red. Brazil.
5 **L. Cámara** L. Often prickly; lvs. as in No. 4, but equalling the peduncles; bracts half as long as the corollas, which are successively yellow, orange, red. Ga., Fla.

6. VITEX, L. Chaste-tree. Calyx 5-toothed. Cor. cup-shaped, 5-lobed, somewhat 2-lipped. Stamens 4, unequal, exserted. Drupe entire, 4-celled, 4-seeded. ♄ With opposite, digitate leaves and paniculate cymes.

1 **V.** Agnus-cástus. Leaflets 5 or 7, lanceolate, entire, pointed both ways; panicles white-tomentous, terminal, interrupted; corolla purplish. Hardy. S.
2 **V.** Negúndo. Leaflets 3 or 5, oblong, serrate, acuminate. Mauritius.
3 **V.** incìsa. Leaflets 5 or 7, incisely pinnatifid, acuminate. China.

Order XCI. LABIATÆ. Labiate Plants.

Herbs with square stems, and opposite, aromatic, exstipulate leaves. *Flowers* axillary, in verticillasters, sometimes as if spiked or in heads. *Corolla* labiate (rarely regular), upper lip external in the bud. *Stamens* 4, didynamous, or only 2. *Ovary* free, deeply 4-lobed, the single style arising from between the lobes. *Fruit* composed of 4 (or by abortion fewer) separable 1-seeded nuts or achenia. Figs. 23, 69, 96, 281, 292, 318, 384.

§ Stamens 2, perfect,—*p* ascending beneath the galea; anthers 1-celled. (Tribe IV.)
—*p* ascending through a cleft in the galea; anthers 2-celled...(*b*)
—*p* exserted, distant; anthers 2-celled...(*d*)
§ Stamens 4, perfect,—*q* all declined toward the lower lip. (Tribe I.)
—*q* erect, or ascending toward the upper lip...(2)
2 Stamens of equal length, corolla almost regular, 4–5-lobed...(*c)
2 Stamens, the upper pair longer than the lower (outer), and calyx 13–15-veined. (Tribe V.)
Stamens, the lower pair longer than the upper (interior) pair...(3)
3 Stamens divergent, apart, mostly straight and exserted...(*e*)
3 Stamens parallel, ascending and long-exserted from the upper side...(*b*)
3 Stamens parallel, ascending in pairs beneath the upper lip...(4)
4 Calyx 13-veined, 5-toothed, and somewhat 2-lipped...(*f*)
4 Calyx 5–10-veined, or irregularly netted...(5)

5 Calyx strongly 2-lipped, upper lip truncate, closed in fruit...(*h*)
5 Calyx not 2-lipped, 3 or 4-lobed, open in fruit...(*k*)
5 Calyx subequally 5-toothed, teeth not spinescent...(*m*)
5 Calyx subequally 5-toothed, teeth spinescent...(*n*)
5 Calyx unequally 8–10-toothed...(*o*)
I. OCIMOIDEÆ.—*r* Corolla upper lip 4-lobed, lower entire, flattish...............OCIMUM. 1
—*r* Corolla upper lip 4-lobed, lower saccate, deflexed...........HYPTIS. 2
—*r* Corolla upper lip 3–4-fid, lower boat-form, involving the sta..COLEUS. 3
—*r* Corolla upper lip 2-lobed, lower 3-lobed.......................LAVANDULA. 4
II. AJUGOIDEÆ.—*b* Stamens 2, exserted through a fissure in the tube...........AMETHYSTEA. 5
—*b* Stamens 4, exserted through a fissure in the tube..........TEUCRIUM. 6
—*b* Stamens very long, involute, arching the corolla..........TRICHOSTEMMA. 7
—**c* Corolla limb equally 5-lobed. Stamens short..............ISANTHUS. 8
III. SATUREJEÆ.—(Stamens diverging or ascending, 2-celled. Corolla lobes flattish, spreading.)
—**c* Corolla limb obliquely 5-lobed. Leaves purple...........PERILLA. 9
—**c* Corolla limb 4-lobed, upper lobe broadest......................MENTHA. 10
d Corolla nearly regular, 4-lobed. Calyx naked in the throat..............LYCOPUS. 11
d Corolla bilabiate,—*s* cyanic, throat naked. Stamens straight...........CUNILA. 12
—*s* cyanic, throat naked. Stamens ascending.........HEDEOMA. 13
—*s* yellow, throat with a hairy ring inside...............COLLINSONIA. 14
e Calyx 15-veined. Stamens exserted, divergent..................................HYSSOPUS. 15
e Calyx 10-veined, the veins obscured by hairs. Corolla yellow, fringed.......COLLINSONIA. 14
e Calyx 10–13-veined,—*t* throat naked.—*u* Stamens straight, divergent.......PYCNANTHEMUM. 16
—*u* Sta. ascending, anth. spurless......SATUREJA. 17
—*u* Sta. ascending, anth. spurred.......DICERANDRA. 18
—*t* throat hairy.—*v* Bracts roundish, large...............ORIGANUM. 19
—*v* Bracts narrow, minute..............THYMUS. 20
f Tube of the corolla straight. Leaves small, subcrenate or entire............CALAMINTHA. 21
f Tube of the corolla curved upward. Leaves large, coarse-crenate............MELISSA. 22
IV. MONARDEÆ.—Connectile long, transverse, distancing the anther cells......SALVIA. 23
—Connectile continuous with fil. toothed at the juncture.......ROSMARINUS. 24
—Connectile inconspicuous.—*w* Calyx subequally toothed.....MONARDA. 25
—*w* Calyx bilabiate, aristate......BLEPHYLLIA. 26
V. NEPETEÆ.—Stamens distant, exserted. Flowers in terminal spikes. ....LOPHANTHUS. 27
—Stamens all ascending.—*x* Anther cells divergent, much........NEPETA. 28
—*x* Anther cells divergent, little........DRACOCEPHALUM. 29
—*x* Anther cells parallel. Fls. large.....CEDRONELLA. 30
VI. STACHYDEÆ.—(Stamens parallel, ascending. Cor. upper lip galeate. Cal. 5–10-veined.)
h Calyx lips toothed, upper 3 teeth minute, lower 2 large.........................BRUNELLA. 31
h Calyx lips entire, upper with an appendage on the back.........................SCUTELLARIA. 32
k Calyx 3-lobed. Anthers all distinct. Flowers purple streaked..........MACBRIDEA. 33
k Calyx 4-lobed. Anthers, the highest pair connate........................SYNANDRA. 34
m Corolla tube inflated in the midst, whitish. Lips small.........................PHYSOSTEGIA. 35
m Corolla tube inflated at the throat, purple. Lower lip long..................LAMIUM. 36
m Corolla inflated in the broad, concave upper lip, purple or yellow...........PHLOMIS. 37
m Corolla not inflated, short.—*y* Calyx salver-form, 10-ribbed.................BALLOTA. 38
—*y* Calyx broad-bell-form, netted...............MOLLUCELLA. 39
n Anthers opening transversely, ciliate-fringed. Leaves notched..........GALEOPSIS. 40
n Anthers opening lengthwise.—*z* Achenia rounded at the top. Native...STACHYS. 41
—*z* Achenia rounded at the top. Cultivated..BETONICA. 42
—*z* Achenia truncate, 3-angled at top..........LEONURUS. 43
o Corolla white, upper lip flattish. Style equally bifid...........MARRUBIUM. 44
o Corolla white, upper lip concave. Style unequally bifid. South..LEUCAS.
o Corolla scarlet, exserted. Calyx upper tooth longest..............LEONOTIS. 45

1. ÒCIMUM, L. SWEET BASIL. Upper lip of calyx orbicular, lower 4-fid. Cor. resupinate, one lip 4-cleft, the other undivided. Stam. 4, declined, the lower pair longer, the upper often with a process at their base. Verticils 6-flowered, in terminal, interrupted racemes.

O. basílicum L. Lvs. smooth, ovate-oblong, subdentate, petiolate; cal. ciliate. ① Plant 6—12′, in the kitchen-gardens. Very fragrant.

2. CÒLEUS, Lour. Cal. deflexed in fruit, unequally 5-toothed. Cor. decurved, upper lip obtusely 3-4-cleft, lower longer, entire, concave, involving the 4 stamens. ① Verticils 6–∞-flowered. Asia.

C. BLÙMEI. Leaves large, ovate, bluntly serrate; verticillasters distinct, ∞-flowered. ♃. Tender, cultivated for its splendid leaves, which are marked with crimson, green, and bronze. Flowers inconspicuous.

3. HÝPTIS, L. Calyx 5-toothed, teeth acute or subulate. Cor. tube cylindric, limb 5-lobed, the lower abruptly deflexed, contracted at its base, the 4 others flat, erect or spreading. Stam. 4, declinate. Ach. ovoid or oblong.—In our species the flowers are in involucrate heads. Summer.

H. radiàta Willd. Erect, glabrous; leaves lance-ovate to lance-linear, unequally and bluntly serrate, tapering to the petiole; heads opposite, pedunculate, at length globular, bracts seeming radiate. ♃ Damp, S. 2—3f.

4. LAVÁNDULA, L. LAVENDER. Cal. ovoid-cylindric, with 5 short teeth, the upper one often largest. Cor. upper lip 2-lobed, lower 3-lobed, lobes all nearly equal, tube exserted, stamens included. ♄

L. SPICA. Leaves hoary, linear-oblanceolate to linear-lanceolate, rolled at edge, sessile, in the interrupted spike bract-like; flowers small, lilac. Very fragrant, and yielding the well-known *Oil-of-Lavender*. 12—18′. July.

5. AMETHÝSTEA, L. Flowers as in Teucrium, but the stamens are only 2. ① From Siberia.

A. CŒRÙLEA.—A branching, smooth herb, 1f high, with the leaves 3-parted and incised, and blue (to white) corollas little exceeding the calyx. July—Oct.

6. TEǓCRIUM, L. GERMANDER. Cal. subcampanulate and subregular, in 5 acute segments. Cor. with the 4 upper lobes nearly equal, the lowest largest, roundish. Stam. 4, exserted from the deep cleft in the upper side of the tube.

T. Canadénse L. Plant erect, hoary-pubescent; lvs. ovate-lanceolate, acute, serrate, petiolate; bracts linear-lanceolate, about as long as the calyx; spike long, of many crowded verticils of odd-looking purplish flowers. ♃ Damp grounds. 2f. July.

7. TRICHOSTÉMMA, L. BLUE CURLS. Calyx very oblique, veiny, lower lip of 2 short teeth, upper twice as long, of 3, all acute. Cor. tube slender, limb obliquely 5-lobed. Filam. 4, very long, exserted and curved. ① Cymes loose, panicled. Corolla blue.

1 **T. dichótoma** L. Lvs. oblong-lanceolate, attenuate at base, obtuse, entire pubescent, as well as the stem and branches. Dry soils, Mass., and S. 1f. August.

2 **T. lineàre** N. Leaves linear, nearly smooth; stem and branches puberulent. Dry soils, N. Y. (at Salem), and S. 1f. Flowers as in the other, 4″. July, Aug.

8. ISÁNTHUS, Mx. FALSE PENNYROYAL. Calyx equally 5-toothed, throat naked. Cor. 5-parted, tube straight and narrow, segm. ovate and equal. Stam. subequal, incurved, ascending, longer than the corolla. ♃ Viscid, pubescent, with entire leaves acute at each end. Flowers axillary.

I. cœrùleus Mx.—Dry fields, N. and W. 1—1½f. Branching and leafy, resembling Pennyroyal. Leaves lance-elliptic, 3-veined. Flowers 1—2 in each axil, blue. July.

9. PERÍLLA, L. Calyx subequally 5-toothed, in fruit becoming gibbous and 2-lipped. Cor. bell-form, 5-cleft, upper lobe a little longer. Sta. 4, erect, distant, included.—Asia.

P. OCIMOÌDES, *β.* NANKINÉNSIS, is the PURPLE PERÍLLA, a fine leaf-plant, 2f high, with large bronze-purple, ovate, cut-fringed leaves. (*β.* crispa Benth.) ①

10. MENTHA, L. MINT. Cal. equally 5-toothed. Cor. nearly regular, tube scarcely exserted, border 4-cleft, the broadest segment emarginate. Stam. 4, straight, distant, anth. cells parallel, fil. naked. ♃ Strong-scented herbs. Flowers in dense verticils, pale purple. Summer.

* Leaves sessile. Verticils in a slender, terminal spike......................Nos. 1—3
* Leaves petiolate.—*x* Verticils in dense oblong spikes......................Nos. 4, 5
—*x* Verticils axillary, not in spikes.....................Nos. 6—8

1 **M. víridis** L. *Spearmint.* Smoothish; lvs. lance-oblong, acute, cut-serrate; spikes interrupted, attenuate above. Damp soils. 1—2f. § Europe.

2 **M. rotundifòlia** L. Whitish-downy; lvs. roundish to broad-ovate, sharp-serrate; spikes cylindric, nearly continuous. N. J., Pa. (at Easton, Prof. Porter). Ascending 2—3f. Spikes 2—3′. § Europe.

3 **M. sylvéstris** L. Woolly-tomentous; lvs. lance-ovate, canescent, finely serrate; spikes conic-cylindric. Delaware Co., Pa. (A. H. Smith).

4 **M. piperìta** L. *Peppermint.* Smooth; lvs. ovate to lanceolate, serrate; spikes 1′, oblong to cylindric; calyx smooth. Wet. 2f. § Europe.

5 **M. aquática** L. Stem reflex-hairy; leaves ovate, serrate, hairy or smoothish; spike globular or oblong, calyx villous. Muddy. §

6 **M. satìva** L. Stem reflex-hairy, erect, branched; leaves ovate, canescent beneath; calyx teeth subulate-awned. Lancaster, Pa. (Porter). § Europe.

7 **M. arvénsis** L. Smoothish, ascending; leaves ovate, serrate above, entire and acute at base; calyx teeth acute. Fields, M. and W.: rare. §

8 **M. Canadénsis** L. *Horsemint.* Upright, hoary-pubescent with spreading hairs; leaves lanceolate, very acute both ways; cymes shorter than the petioles; stamens exserted. Damp. Can. to Pa. and Ky.

β. ***boreàlis.*** Plant nearly smooth, with narrower leaves.

11. LÝCOPUS, L. WATER HOARHOUND. Cal. tubular, 4–5-cleft. Cor. subregular, 4-cleft, the tube as long as the calyx, upper segment broadest, emarginate. Stam. 2, distant, diverging, simple. ♃ Bog herbs, with the very small flowers in axillary, dense clusters.

1 **L. Virgínicus** L. *Bugle Weed.* Lvs. broad lanceolate, serrate, tapering and entire at both ends; calyx teeth 4, obtuse, spineless, shorter than the achenia. Common. 1—1½f. Plant often purple, and often with long slender runners. July, August.

2 **L. Europæus** L. Lvs. lance-ovate to lance-oblong, petiolate, acute, sinuate-toothed or lobed, the lower incised; calyx teeth 5, acuminate-spinescent, longer than the smooth achenia. Common, and very variable. 1—2f. August.

β. ***rubéllus,*** with creeping stolons, and downy toothed lvs. (L. rubellus Mœnch.)
γ. ***sinuàtus,*** with smooth sinuate-dentate leaves—no runners. (L. sinuatus Ell.)
δ. ***exaltàtus.*** Tall, with smooth leaves cut into linear teeth. (L. exaltatus Ell.)
ε. ***angustifòlius.*** Leaves narrow, slightly toothed or subentire. (L. angust. N.)
ζ. ***sessilifòlius.*** Lvs. oblong, sessile or clasping, remotely toothed. N. J. (Porter).

12. CUNÌLA, L. DITTANY. Cal. 10-ribbed, equally 5-toothed, throat densely villous; upper lip of corolla flat, emarginate. Stam. 2, erect, exserted, distant.—Flowers numerous, pale red.

C. Mariàna L. Lvs. ovate, serrate, subsessile, 1′; cymes pedunculate, corymbous, axillary and terminal. ♃ Rocky woods, N. Y. to Ga. and Ark. 1—2f. July, Aug.

13. **HEDEÒMA**, Pers. AMERICAN PENNYROYAL. Calyx 13-striate, gibbous at base, bilabiate, throat hairy, upper lip 3-toothed, lower 2-cleft. Cor. bilabiate, upper lip erect, flat, emarginate, lower spreading, 3-lobed. Stam. 2, fertile, ascending.—Low, fragrant herbs.

1 **H. pulegioìdes** Pers. Lvs. oblong, few-toothed, petiolate, narrowed to each end; verticils axillary, 6-flowered; corolla equalling the calyx. ① Dry pastures. 6—12′. June—Aug. A small herb of pungent fragrance and taste, common and much used.

2 **H. híspida** Ph. Hairy, branching, with sessile, linear, obtuse leaves and verticils 6-flowered; corolla scarcely exceeding the calyx. ① Banks, W. 2—5′. July.

14. **COLLINSÒNIA**, L. HORSE BALM. Cal. ovoid, 10-striate, upper lip truncate, 3-toothed, lower 2-cleft. Cor. exserted, bell-ringent, upper lip in 4 subequal lobes, lower longer, declined, fringed. Stam. 2 or 4, much exserted, divergent. ♃ Coarse, strong scented, with large, ovate, serrate, petiolate lvs. and yellowish fls., in a terminal, leafless panicle or raceme.

* Stamens 4, perfect, long exserted. Leaves very large. South..............Nos. 1, 2
* Stamens 2, perfect,—*a* the upper pair of filaments mere points............Nos. 3, 4
—*a* the upper pair of filaments capitate. South...........No. 5

1 **C. verticillàta** Baldw. Viscid-downy above; lvs. broad-oval, 6—8′, acute, petioles 1—2′; racemes long, naked; flowers in whorls, 9″; lower lip strongly fringed. Lookout Mt., Tenn., and Middle Ga. 1—2f. Raceme 1f. May, June.

2 **C. anisàta** Ph. Viscid-downy; lvs. cordate, acuminate, crenate, 5—7′, petiole 1′; panicle 3—6′, bracts ovate, flowers 5—6″. Ga., Fla., Ala. 1—2f. July—Sept.

3 **C. Canadénsis** L. Sparsely downy; leaves mucronate-serrate, acuminate, abrupt at base, 4—7′; lower petioles slender; panicle 5—8′, loose, bracts ovate; flowers 5—6″. Damp shades, Can. to La. (Hale). 3—4f. Summer.

4 **C. scabriúscula** Ait. Leaves scabrous above, small (1½—2′), acuminate, acute at base, petioles slender, 1′; panicle leafy, fls. 4—5″, calyx 1″. Woods, S. 2f. Sept.

5 **C. punctàta** Ell. Pubescent; lvs. 4—7′, lance-ovate, pointed, acute at base, resinous-punctate beneath; panicle leafy below, flowers 5″. Woods, S. 2—6f. Sept.+

15. **HYSSÒPUS**, L. HYSSOP. Calyx tubular, 15-striate, equally 5-toothed. Upper lip of the corolla erect, flat, emarginate, lower 3-parted, the middle segment largest, tube about as long as the calyx. Stamens 4.

H. officinàlis L.—Native of Europe and Asia, occasionally cultivated for its medicinal properties. A bushy herb, 2f, with oblong-lanceolate leaves, and bright blue fls. in 1-sided verticils approximate in a terminal spike. St. exserted, diverging. §

16. **PYCNÁNTHEMUM**, Mx. BASIL. Calyx tubular, 10–13-striate, 5-toothed, teeth equal or subbilabiate, throat naked within. Upper lip of corolla nearly entire, lower trifid, middle lobe longest, all ovate, obtuse, stam. 4, distant, subequal, anth. with parallel cells. ♃ Erect, rigid branching herbs, all N. American. Verticils dense, many-flowered. Aug., Sept.

§ Calyx 2-lipped, in flat or loose cymes. Leaves petiolate, subserrate...(*a*)
§ Calyx subregular, in roundish dense heads...(*b*)
a Teeth of the calyx ovate, acute, awnless..............................No. 1
a Teeth of the calyx tipped with bearded awns ....Nos. 2—4
b Calyx teeth and bracts with naked awns as long as the corolla.....Nos. 5, 6
b Calyx teeth awnless, shorter than the corolla...(*c*)

c Heads panicled. Leaves subpetiolate, subentire..............Nos. 7—9
c Heads corymbed. Leaves sessile, entire....................Nos. 10—12
c Heads solitary, involucrate. Leaves serrate......................No. 13

1 **P. albéscens** T. & G. Leaves lance-ovate, acute, whitened beneath, the upper whitened both sides; flowers in little secund racemes. Ala. to La. 2—3f.

2 **P. Túllia** Benth. Villous-pubescent; leaves ovate to lanceolate, acute or pointed; the floral whitened; inflorescence as in No. 1. Mountains, S.

3 **P. incànum** Mx. *Wild Basil.* Whitish, with a soft down; leaves ovate, rounded at base, slightly acuminate; the floral whitened both sides; cymes 1′ and less broad, not racemed; corolla pale red, dotted. Rocky woods, N. and W. 2—4f.

4 **P. clinopodoìdes** T. & G. Villous-canescent; leaves lanceolate, acute both ways; cymes small, dense, terminal and subterminal. Dry soils, N. Y., N. J., and W. 2—3f. Plant not whitened. Heads 6″ diameter.

5 **P. aristàtum** Mx. Smoothish; leaves ovate-oblong, acute, subserrate, rounded at base, petiolate; bracts rigid; heads few, 6—9″ diam. Barrens, N. J., and S. 1—2f.

6 **P. hyssopifòlium** Benth. Smoothish; leaves linear-oblong, obtuse, nearly sessile and entire; heads few, large, 1′ diameter. Barrens, Va. to Fla. 1—2f.

7 **P. Tórreyi** Benth. Slightly pubescent; lvs. lin.-lanceolate, acute, subentire; bracts and subulate calyx teeth white-pubescent. Dry hills, New York Island, N. J.: rare.

8 **P. pilòsum** N. Hoary with soft, spreading hairs; leaves lanceolate, acute at each end, subentire, subsessile; calyx teeth ovate-lanceolate, and with the bracts white-tomentous. Prairies, W. States, to Ga. 2f. Cymes dense, 6—9″.

9 **P. mùticum** Pers. Minutely white-downy at top; leaves ovate to lance-ovate, acute, rounded or subcordate at base; calyx teeth short, merely acute. In dry woods. 2—3f. Heads roundish, dense, 4—6″.

10 **P. lanceolàtum** Ph. Leaves linear-lanceolate, entire, acute, rigid, abrupt at base, sessile; calyx teeth short, hairy; heads small (3—5″). Dry woods, Mass. to Car., and W. 1—2f. Handsome, fragrant, nearly smooth.

11 **P. linifòlium** Ph. Glabrous; leaves linear, attenuated both ways; heads compact, corymbed; calyx teeth pungently awn-pointed. Dry soils. 1—2f.

12 **P. nudum** N. Glabrous, pale, subsimple; leaves few and small, ovate-oblong, obtuse, entire, sessile; calyx teeth acute, pubescent. Mts., N. Car. to Ga. 1—2f.

13 **P. montànum** Mx. Glabrous except the villous-ciliate ovate and linear bracts; leaves lanceolate, serrate, acute; heads involucrate. Mountains, Va. and Car. 1—2f. Resembles a Monarda. Fragrant.

17. **SATURÈJA**, L. Summer Savory. Calyx tubular, 10-ribbed, throat not hairy. Segments of the bilabiate corolla not equal. Stamens diverging, scarcely exserted.—Herbs with small leaves and purplish fls.

S. horténsis L. St. branching; lvs. linear-oblong, entire, acute at the end; ped. axillary, cymous. ① River banks, W., escaped from gardens: rare. §

18. **DICERÁNDRA**, Benth. Calyx 13-striate, tubular, upper lip subentire, lower bifid, throat hairy. Cor. tube exserted, straight, strongly 2-lipped, the upper erect, emarginate, the lower spreading. Sta. 4, exserted, distant, anther cells divaricate, each with a little horn. ① Branching, smooth, with loose cymes.

1 **D. linearifòlia** B. Stem and branches strict; lvs. linear, or linear-oblong; cymes stalked, of 1—5 showy pink flowers, forming slender panicles. Dry woods, Prince Edward County, Va. (Dr. Mettauer), to Fla. (Miss Keen). 1f. October.

2 **D. densiflòra** B. Leaves lance-oblong; cymes sessile, 5-10-flowered. E. Fla.

19. **ORÍGANUM**, L. Marjoram. Calyx tube 10-striate, 5-toothed,

hairy in throat. Corolla tube scarcely exserted, upper lip erect, flat, emarginate, lower with 3 nearly equal segments. Stamens 4, ascending, distant. ♃ Leaves subentire. Fls. in dense oblong spikes, with imbricated bracts.

1 **O. vulgàre** L. *Wild M.* Leaves ovate, petiolate, hairy; spikes corymbed; bracts ovate, purplish; calyx teeth equal. Fields: rare. 1f. June, July.

2 **O.** MARJORÀNA. *Sweet M.* Leaves oval or obovate, obtuse, petiolate, hoary-pubescent; bracts roundish; calyx tube split below. 1f. A kitchen vegetable.

20. THỲMUS, L. THYME. Cal. 2-lipped, ovoid, 13-veined, upper lip of 3, the lower of 2 subulate teeth, throat hairy. Cor. moderately 2-lipped. Sta. straight, exserted, distant. ♄ Leaves small, entire, strongly veined. Bracts minute. Flowers purple. European culinary herbs.

1 **T. Serpýllum** L. *Wild T.* Stems creeping and ascending, leafy, each terminated with a small, dense, oblong head of flowers grateful to bees. † §. June.

2 **T.** VULGÀRIS. Stems erect from the decumbent base; lvs. oblong-ovate to lanceolate, the sides revolute; fls. in term., leafy spikes. Much branched. 6—10′ high. Jn., Jl.

21. CALAMÍNTHA, Mœnch. CALAMINTH. Cal. tubular, 13-nerved, throat mostly hairy, upper lip 3-cleft, lower 2-cleft. Corolla tube straight, exserted, throat inflated, limb bilabiate, upper lip erect, entire or emarginate, lower spreading, its middle lobe largest. Stamens 4, the lower pair longer, usually ascending. ♃

§ Herbs hairy. Cymes dense, capitate, bracted. Calyx tube curved, 2-lipped..No. 1
§ Herbs hairy. Cymes loose, pedunculate. Calyx tube straight, 2-lipped.......No. 2
§ Herbs smooth. Cy. loose, sessile, bracted. Cal. straight, teeth subregular...No. 3
§ Shrubs low, slender, nearly smooth. Cymes few-flowered. Fls. large....Nos. 4—7

1 **C. Clinopòdium** Benth. *Wild Basil.* Plant clothed with whitish hairs; leaves ovate, subserrate; fls. purplish, in dense verticils or heads, with many subulate bracts. Low woods, N. and W. 1—2f. Heads near 1′ wide. June—August.

2 **C. Nèpeta** Link. Branched below, soft-villous; leaves small, broad-ovate, obtuse; cymes few-flowered, becoming some racemed; corolla white, 3—4″; calyx 1″. Va., Tenn., to Ga. Roadsides, &c. 2f. Strongly aromatic. July, August. § Europe.

3 **C. glabèlla** B. Smooth, decumbent at base, diffusely branched; leaves narrowly oblong, tapering to base; verticils 6–10-flowered. Rocks, O. to Ark. 18′. Cor. 4—5″, pale violet. Fragrant like Pennyroyal. Often produces runners, and runs into

*β. **diversifòlia.*** Flowering stems nearly erect, the barren prostrate like runners, bearing small ovate leaves (3—4″). Rocks, Niagara, and N-W. 10′.

4 **C. Caroliniàna** Sw. Smooth, simple; lvs. ovate, obtuse, crenate-serrate; bracts similar; cy. few-flwd., on short stalks; cor. rose-purp., 7—9″. Dry woods, S. 15′. Jl.

5 **C. coccínea** B. Shrub with virgate branches; lvs. narrowly ovate-oblong; verticils of 2—6 ample scar. fls.; cor. 15—18″, gland.-pubescent. Sandy shores, Fla. 2f.

6 **C. canéscens** T. & G. Low shrub, minutely canescent-downy; leaves linear, with rolled edges, obtuse, crowded; fls. sol., opp., 8″, rose-red. Sandy shores, Fla. 8—12′.

7 **C. dentàta** Chapm. Tomentous; lvs. wedge-obovate, 2-4-toothed at apex. Fla. 2f.

22. MELÍSSA, Tourn. BALM. Calyx 13-ribbed, the upper lip 3-toothed, flattened and dilated, lower bifid. Cor. tube recurved-ascending, upper lip erect, flattish, lower spreading, 3-lobed, the middle lobe mostly broadest. Stamens ascending.

M. officinàlis L. Pubescent; st. erect, branching; fls. in loose, axillary cymes;

leaves ovate, crenate-serrate, petiolate; bracts similar; corolla 7″, yellowish. Gardens, whence it has escaped into the fields and woods. 1—3f. July, August.

23. SÁLVIA, L. SAGE. Cal. striate, bilabiate, upper lip 3-toothed or entire, lower bifid, throat naked. Corolla ringent, tube equal, upper lip straight or falcate, lower spreading or pendent, 3-lobed. Stamens 2, connectile transverse on the filament, supporting at each end a cell of the halved anther. ♄ ♃ Figs. 96, 281.

* Native species.—§ Calyx limb 3-lobed. Lower anther cell wanting.......Nos. 1—3
—§ Calyx deeply 2-lipped, 5-toothed. Both cells present..Nos. 4—6
* Species cultivated (No. 7 spontaneous).—*a* Flowers blue............. ....Nos. 7—9
—*a* Flowers white..............Nos. 10, 11
—*a* Flowers yellow.................No. 12
—*a* Flowers red.—*b* Herbaceous..Nos. 13, 14
—*b* Shrubby.....Nos. 15, 16

1 S. azùrea Lam. Smoothish, branching; lvs. linear-oblong and linear, subentire, acutish; racemes slender; verticils 2–6-flowered; corolla pubescent, tube barely exserted; limb azure blue. ♃ S. Car. to Fla. and La. 1—3f. Summer.

2 S. longifòlia N.? Tall, branched, puberulent; leaves oblong-lanceolate, serrate; racemes slender; corolla 8—9″, tube twice longer than calyx. ♃ Ga. to Ark. 3—6f.

3 S. urticifòlia L. Thinly pubescent; leaves rhomb-ovate, acute, serrate, decurrent on the petiole; verticils 4–10-flowered, distant in the raceme; corolla smooth, tube little longer than the calyx. ♃ Hilly woods, Va., and S. 18′. May.

4 S. lyràta L. Lvs. radical, lyrate, erose-dentate, many, stem lvs. about 1 pair, linear-spatulate, bract-like; fls. in whorls, racemed at top of the square scape. ♃ In woods. 6—15′. Flowers 1′, violet-purple. April—June.

5 S. obovàta Ell. Lvs. broad-obovate, entire, the floral ovate; verticils remote in the raceme; corolla blue, 8″, calyx 3″. ♃ Ga. to La. 1—2f. June, July.

6 S. Claytòni Ell. Lvs. cordate- to lance-ovate, sinuate-pinnatifid, and toothed, rugous, bracts ovate, pointed. ♃ Sandy fields, S. Car.

7 S. Sclàrea L. Lvs. ample, rugous, broad-cordate, doubly crenate; bracts colored; corolla pale purple, upper lip high-arched. ② Gardens, § in Penn.

8 S. OFFICINÀLIS. *Garden Sage.* Shrubby; leaves lance-oblong, crenulate, rugous; corolla upper lip vaulted, equalling the lower. From S. Europe. 1f. July.

9 S. PATENS. Hispid and hairy; leaves ovate-deltoid or ovate-hastate, crenate; flowers very large; calyx bell-form, 7″; corolla blue, 2′ long; stamen exserted. Mexico. 3f.

10 S. ARGÉNTEA. Leaves white with wool, large, ovate, sinuate-lobed, the floral concave; flowers 18″, racemed, the upper lip long-falcate. S. Europe.

11 S. CHIONÁNTHA, with large white-woolly, linear-lanceolate leaves and very large (2′) white flowers with arched galea, is from Asia Minor.

12 S. AÙREA. Shrub 3—4f, with roundish ovate whitened leaves, the splendid yellow flowers 2½′, calyx 1′, in dense racemes. From Africa.

13 S. COCCÍNEA. Stem and ovate-cordate leaves beneath hoary-downy; verticils of 6—10 red smooth flowers (8″) in a raceme; cal. 2-colored, 4″. ♃ Cuba, § in Ga., &c. 1—2f.

14 S. PSEUDO-COCCÍNEA, 3f high, is hispid with long spreading hairs, has ovate leaves rounded at base. Otherwise like No. 14. ♃

15 S. FULGENS. Plant branching, weak-stemmed, pubescent, with lance-ovate, subcordate leaves, the corollas 2′, bright red, opposite, in terminal racemes. Mexico.

16 S. SPLENDENS. Plant erect, smooth, with ovate lvs. and opposite pubescent flowers; calyx 1′, scarlet as well as the 2′ corollas. The commonest species. Mexico. 3f.

24. ROSMARÌNUS, L. ROSEMARY. Calyx upper lip entire, lower bifid. Cor. upper lip 2-parted, lower lip reflexed, in 3 divisions, of which the middle is the largest. Fil. 2, fertile, elongated, ascending toward the upper lip, having a tooth on the side. ♄ S. Europe.

R. officinàlis. Shrub evergreen with opposite, linear-oblong, obtuse, shining leaves. Flowers axillary and terminal, bright blue, fragrant of camphor. 4f.

25. MONÁRDA, L. MOUNTAIN MINT. Calyx elongated, cylindric, striate, subequally 5-toothed. Cor. ringent, tubular, upper lip linear, lower lip reflexed, 3-lobed, the middle lobe narrowest. Sta. 2, fertile, ascending beneath the upper lip, and mostly exserted, anth. cells divaricate at base, connate at apex. ♃ Verticils few, dense, many-flwd., bracted. Jl.—Sept.

* Calyx densely hairy in the throat. Corolla purple or whitish..............Nos. 1, 2
* Calyx naked in the throat. Corolla scarlet or yellow.....................Nos. 3, 4

1 **M. fistulòsa** L. *Horsemint. Wild Bergamot.* Lvs. ovate to lanceolate, pointed, serrate or subentire, petiolate ; flowers in large terminal heads ; corollas 1′, exserted, greenish white, pale lilac, or blue. Thickets, W. Vt., W. and S. 2—4f. Variable.

2 **M. Bradburiàna** N. Lvs. ovate to lanceolate, acute, rounded at base, subsessile ; cal. curved, teeth spinescent (as in No. 1) ; bracts and corolla purple. Prairies, W. 3f.

3 **M. punctàta** L. Lvs. lance-oblong, tapering to the petiole ; bracts leafy, colored, longer than the pale yellow, brown-spotted corollas. Barrens, N. J., S. and W. 2—3f.

4 **M. dídyma** L. St. branching, acutely 4-angled ; lvs. broad-ovate, pointed, short-petiolate ; heads terminal and subterminal, with large (15″) showy crimson corollas, and bracts stained with the same hue. Swamps : rare. Often cultivated. 2f.

26. BLEPHÍLIA, Raf. Calyx 13-veined, upper lip 3-toothed, lower lip shorter, 2-toothed, the teeth setaceous. Cor. upper lip short, erect, oblong, obtuse, entire, lower lip of 3 unequal, spreading lobes, the lateral ones orbicular. Stam. 2, fertile, ascending, exserted. ♃ Verticils dense, approximate in a spike.

1 **B. hirsùta** Benth. Hirsute all over, wide-branched ; lvs. ov.-lanceolate, pointed, serrate, petiolate ; bracts oblong, acuminate, colored, shorter than the pale, purple-spotted flowers ; cor. 5″. Damp woods, N. Eng., W. Pa., and W. 1—2f. June, July.

2 **B. ciliàta** Raf. Thinly hirsute, simple ; lvs. lance-oblong, distant, subsessile ; verticils 3—5, the ovate bracts long as the calyx. Barrens, Pa., S. and W. 2-4f. Jl.-Sept.

27. LOPHÁNTHUS, Benth. HEDGE HYSSOP. Cal. 15-ribbed, oblique, 5-cleft, upper segments longer. Cor. upper lip bifidly emarginate, lower lip 3-lobed, the middle lobe broader and crenate. Stam. diverging. ♃ Tall, erect. Verticils spicate.

1 **L. nepetoìdes** B. Stem smooth, stout, angles sharp ; lvs. ovate, pointed, serrate ; calyx teeth ovate, obtusish, green, in spikes 2—3′ long ; corollas inconspicuous, greenish white. Fence-rows, &c., M. and W. 3—6f. July, Aug.

2 **L. scrophularifòlius** B. Stem pubescent, angles obtuse ; leaves ovate, crenate-serrate ; calyx teeth lanceolate, acute, colored ; corolla pale purple. Borders of fields, M. and W. 3—4f. July, Aug. Closely resembles No. 1.

3 **L. anisàtus** B. Smooth ; leaves ovate, &c., whitened beneath ; calyx teeth as in No. 2 ; corolla azure-blue, fragrant of anise. Wis. to Dak. (Dr. Matthews.)

28. NÉPETA, L. CATMINT. GROUND IVY. Cal. tubular, 5-toothed ; Cor. tube slender below, dilated and naked in the throat, upper lip emarginate, lower 3-lobed, the middle lobe largest and crenate, margin of the orifice reflected. Sta. ascending, anther cells divergent. Figs. 318, 384.

§ Tall. Verticils in a terminal raceme. Calyx nearly regular.......... ....No. 1
§ Glechòma. Low, diffuse. Flowers axillary. Calyx curved, oblique ....No. 2

1 **N. catària** L. *Catnip.* Erect, hoary-tomentous; lvs. petiolate, cordate, deltoid-ovate, coarsely crenate-serrate; flowers spiked, the whorls slightly peduncled. ♃ About old buildings, &c. 2—3f. July. §. The delight of cats.

2 **N. Glechòma** B. *Gill-over-the-Ground.* Leaves reniform, crenate; corolla 3 times longer than the calyx (10″), bluish purple, anthers forming 2 little crosses. ♃ Creeping in grass, about walls, &c. 3′—1f. May. § Europe.

29. DRACOCÉPHALUM, L. Dragon-head. Calyx subequal, oblique, 5-cleft, upper segment larger. Cor. bilabiate, upper lip vaulted, emarginate, throat inflated, lower lip spreading, 3-cleft, middle lobe much larger, rounded or subdivided. Sta. 4, distinct, ascending, the upper pair longer. ②

D. parviflòrum N. Plant some downy, slender; leaves petiolate, lanceolate, deeply serrate; flowers small, bluish, spicate. N. New York, and W.: rare. 18′. July.

30. CEDRONÉLLA, Mœnch. Cal. subcampanulate, 5-toothed. Cor. tube exserted, throat dilated, upper lip straight, flattish, emarginate or cleft, lower 3-fid, middle lobe largest. Stam. 4, ascending, the upper longer, anther-cells parallel. Flowers spicate, bracted. Summer.

1 **C. cordàta** N. Pubescent, producing runners; leaves cordate, petiolate, bluntly crenate; spikes unilateral, corolla pale blue, 1′. ♃ Rocks, O., Va.: rare. 1f. June.

2 **C.** Mexicàna. Erect, with cordate-lanceolate, dentate leaves; flowers in a spike of close whorls, purple, large. Mexico. 2—3f. (Gardoquia (Lind.))

31. BRUNÉLLA, Tourn. Self-heal. Blue-curls. Cal. about 10-ribbed, upper lip dilated, truncate, with 3 short teeth, lower lip with 2 lanceolate teeth. Filam. forked, one point of the fork bearing the anther. ♃

B. vulgàris L. Stem simple; leaves oblong-ovate, toothed, petiolate; flowers blue, in a large oblong-ovoid spike of dense verticils with reniform bracts. Low grounds, very common, varying from 8′ to 2f. All Summer.

32. SCUTELLÀRIA, L. Skull-cap. Cal. campanulate, lips entire, upper one appendaged on the back and closed after flowering. Cor. upper lip vaulted, lower dilated, convex, tube much exserted, ascending, throat dilated. Stam. ascending beneath the upper lip, anthers approximate in pairs, achenia tubercular. ♃

§ Flowers large (7 to 13″ long), racemed at top of the stem, with bracts...(*a*)
  a Bracts ovate, abrupt at base. Lips of corolla short. Petioles long...Nos. 1, 2, 3
  a Bracts lance-oblong, acute at base. Leaves notched, petiolate...(*b*)
    b Galea of the corolla longer than the lower lip.....................Nos. 4, 5
    b Galea of the corolla not longer than the lip........................Nos. 6, 7
  a Bracts leaf-like, longer than the calyx. Leaves entire, subsessile .. Nos. 8—10
§ Flowers large or small, opposite, solitary, in the axils of the leaves.....Nos. 11—13
§ Flowers small (3″ long), in slender, axillary, one-sided racemes..............No. 14

1 **S. versícolor** N. Glandular-hairy, erect, branched; leaves broad-ovate, cordate, crenate, veiny; racemes long, many-flowered; bracts ovate, entire, subsessile; corolla 6—7″, lips blue, subequal, lateral lobes distinct. Pa., and W. States. 1½—4f.

2 **S. rugòsa** Wood. Hairs and leaves as in No. 1, but the stem is weak, ascending, bracts petiolate, and the lower lip of the (8″) corolla pendent and twice longer than the upper. Rocky shores, Harper's Ferry, Va., and S-W. 18′.

3 **S. saxátilis** Rid. Smoothish and not glandular, weak, ascending; leaves as in Nos. 1, 2; bracts as in No. 2; corolla 8″, lips equal, upper 3-lobed. Del., Va., and W. 2f.

4 **S. canéscens** N. Erect, pubescent; leaves ovate to oblong, lower cordate; rac. terminal and axillary; bracts lance-linear; corolla 8″, *canescent*, upper lip arched, remote from the lower. Dry soils, M. and W.: common. 1—3f. (S. arguta Bkly.)

5 **S. villòsa** Ell.? Slender, erect, stem finely tomentous; leaves lanceolate, acute both ways, serrate; flowers paniculate, bracts lance-linear; corolla 9″, tube slender, galea strongly arched, 5 times longer than lip. Ga. (Dr. Feay). 2—3f.

6 **S. serràta** Andr. Erect, subsimple, green, smoothish; leaves ovate, pointed both ways, serrate; rac. few-flwd.; cor. 13″, lips subequal. Woods, E. Pa., Ill., and S. 2—3f.

7 **S. pilòsa** Mx. Erect, subsimple, pubescent; leaves rhomb-ovate or oval, obtuse, remote, crenate-serr.; racemes terminal; corolla 9—12″, lips distant. Pa. to Ga. 2f.

8 **S. integrifòlia** L. Erect, subsimple, tomentous or downy; leaves ovate to lance-linear, obtuse, entire, or the lower crenate; flowers 9″, much enlarged above, the lips subequal, in a terminal raceme. Dry soils, M. and S. 9′—2f.

9 **S. Floridàna** Chapm. Slender, branching; leaves all linear, obtuse, entire, with rolled edges, lowest minute; corolla 1′, enlarged above, lips subequal. W. Fla. 1f.

10 **S.** MACRÁNTHA (or Japonica). In gardens, 1f, smooth (except the hairy calyx); lvs. clasping, lance-linear; flowers 1′, blue, with subequal lips, handsome. China.

11 **S. nervósa** Ph. Slender, erect, producing runners; leaves sessile, broad-cordate, crenate-serr., 3-5-veined; fls. few, 4″, with small floral lvs. Rocks, M. and W. 8—15′.

12 **S. párvula** Mx. Root a string of tubers, stem erect, 3—9′; lvs. ovate to oblong, obtuse, small (6″), sessile, entire; fls. 3″, exceeding the lvs., blue. Fields, M. and W.

13 **S. galericulàta** L. *Common S.* Erect, branched, smoothish or downy; leaves nearly sessile, cordate-oblong or lanceolate, obscurely crenate, acute; flowers few, large (9—12″), sessile, axillary. Low meadows, Can. to Penn. 12—18′.

14 **S. lateriflòra** L. *Mad-dog S.* Smoothish, subsimple; lvs. petiolate, lanceolate, serrate; fls. 4″; rac. axillary, secund, equalling the lvs. Ditches, N., W., M. 1—2f.

33. **MACBRÌDEA,** Ell. Calyx 3-lobed, upper lobe oblong, narrow, lower rounded. Cor. tube long-exserted, throat inflated, upper lip erect, concave, lower short, spreading, the middle lobe rounded, broadest. Sta. ascending under the upper lip, anthers approximate by pairs. ♃ Erect, subsimple, with large purple-white flowers in heads.

1 **M. púlchra** Ell. Lvs. wedge-lanceolate, acute, serrulate, the floral ovate; corolla 18″, streaked with purple and white. Wet pine-barrens, S. 12—18′. Aug., Sept.

2 **M. alba** Chapm. Lvs. wedge-oblong, obtuse, dentate; the floral roundish; corolla white; lower lobes of the calyx notched. Pine-barrens, W. Fla. 12—18′. July, Aug.

34. **SYNÁNDRA,** N. Cal. 4-cleft, segm. unequal, subulate, converging to one side. Upper lip of corolla entire, vaulted, the lower obtusely and unequally 3-lobed, throat inflated. Sta. ascending beneath the galea, upper pair of anth. cohering, having the contiguous cells empty. ② Flowers solitary, axillary, somewhat spicate above. Figs. 69, 292.

S. grandiflòra N.—Woods, O. to Tenn. 6—18′. Stem simple. Lvs. cordate-ovate, acuminate, petiolate. Cor. white, 1′, with large lobes, purple-striate. June.

35. **PHYSOSTĚGIA,** Benth. LION-HEART. Cal. bell-form, 5-toothed. Cor. much exserted, throat inflated, upper lip concave, entire, lower of 3 broad-spreading lobes. Sta. 4, separate, ascending beneath the upper lip. ♃ Smooth, with lanc., serrate lvs. and term. spikes of showy rose-white fls.

P. Virginiàna B. Stems mostly simple; lvs. oblong to narrow-lanceolate, sessile thick; spikes 4-rowed, ∞-flowered; corolla 8—15″, spotted inside. Wet banks, M., W., and S. Often cultivated. 1—4f. August, September.—Variable.

35. LÀMIUM, L. HENBIT. Cal. 5-veined, with 5 subequal, subulate teeth. Cor. dilated at throat, upper lip vaulted, galeate, lower lip broad, emarginate, lateral lobes truncate, often toothed on each side near the margin of the dilated throat. Stamens 4, ascending. May—November.

* Weeds in waste grounds, with roundish leaves and small purple flowers...Nos. 1. 2
* Lvs. cordate, ovate. Fls. larger (1′), hairy in throat, side-lobes toothed...Nos. 3, 4

1 **L. amplexicaùle** L. Leaves cut-crenate, petiolate, the floral sessile-clasping; corolla slender (6″), galea entire, side-lobes not toothed, throat spotted. ① 6—10′.

2 **L. purpùreum** L. Lvs. roundish to ovate, crenate, all petiolate; corolla slender, 6″, hairy within, side-lobes with a subulate tooth, galea entire. ① Penn., &c.: rare.

3 **L. alba** L. Lvs. hairy, petiolate; cor. white, curved, a hairy ring within, and the side-lobes with a tooth. Waysides: rare. Flowers in whorls. Cultivated.

4 **L.** MACULÀTUM (or rugòsum). Leaves hairy, rugous, petiolate, marked with a white oblong spot along the midvein. Flowers as in No. 3, but purplish. Cultivated.

37. PHLÒMIS, L. JERUSALEM SAGE. Calyx truncately 5-toothed. Cor. galea broad, keeled, lower lip spreading, 3-fid. Stamens ascending beneath the galea, the upper pair appendaged at base. Leaves rugous. Verticils showy, axillary.

P. tuberòsa. Tall, smoothish, with large ovate-cordate, crenate leaves; fls. 30—40 in a whorl, purple, hairy inside. Scarce in gardens and waste grounds.

38. BALLÒTA, L. BLACK HOARHOUND. Cal. funnel-form, 10-veined, 5-toothed. Cor. tube cylindrical, as long as the calyx, upper lip concave, crenate, lower lip 3-cleft, middle segment largest, emarginate. Sta. 4, ascending, exserted. Achenia ovoid-triangular. ♃

B. nìgra L. Lvs. ovate, subcordate, serrate; bracts linear-subulate; cal. throat dilated, teeth spreading, acuminate. Waste places, N. Eng.: rare. July. § Europe.

39. MOLUCCÉLLA, L. MOLUCCA BALM. SHELL FLOWER. Calyx campanulate, very large, the margin expanding, often repand-spinous. Corolla tube included, limb bilabiate. Stamens 4, ascending. ①

M. LÆVIS. A curious plant, noted for its ample calyx, much larger than its small, yellowish corolla. Stem smooth, 2f; leaves round-ovate, cut-crenate. Syria.

40. GALEÓPSIS, L. HEMP NETTLE. Cal. 5-cleft, spinescent. Upper lip of the corolla vaulted, subcrenate, lower lip with 3 unequal lobes, having 2 teeth on its upper side, middle lobe largest, cleft and crenate. Sta. exserted, anth. cells transverse. ① Vert. distant, many-flwd. § Eur.

1 **G. Tetràhit** L. St. hispid, the internodes thickened upward; leaves ovate, hispid, serrate; cor. twice as long as the calyx, upper lip nearly straight, concave; corolla white-purple. A common weed in fields and waste grounds, N. States. 1—3f. Jn., Jl.

2 **G. Làdanum** L. Internodes equal; lvs. lanceolate, subserrate, pubescent; upper lip of the corolla slightly crenate; corolla roseate. Waste soils: rare. 1f. August.

41. STACHYS, L. HEDGE NETTLE. Cal. tube angular, bell-form, 5- or 10-ribbed, with 5 acute or pungent teeth. Cor. upper lip erect-spreading or some vaulted, lower spreading, 3-lobed, mid-lobe largest. Stamens ascending, lower pair longer, anthers approximating by pairs. Verticils 2–10-flowered, approximating in a terminal raceme.

Our species are much alike, yet easily distinguished. They have stems mostly hispid, leaves elliptic-lanceolate, crenate-serrate, narrowed to an abrupt base, and corolla pale-purple with deeper spots. Summer.

* Plants ♃, leaves smooth. Calyx teeth divaricately spreading............Nos. 1, 2
* Plants hispid or hairy.—*a* ♃ Calyx teeth spinescent. Lvs. subsessile.....Nos. 3, 4
—*a* Calyx teeth acute. Leaves petiolate...........Nos. 5, 6

1 **S. hyssopifòlia** Mx. Leaves sessile, linear-lanceolate, serrulate, small (1—2′); calyx teeth half as long as the 7′′ corolla. Mass. to Mo., and S. 6—12′.

2 **S. glàbra** Rid. Leaves all petiolate, serrate; calyx teeth much spreading, as long as the corolla tube. Woods, N. Y. to Mich., and S. 15′—3f. Racemes 3—7′.

3 **S. palústris** L. Stout, hirsute; leaves some pointed, large, hoary beneath; corolla twice longer (7—8′′) than the calyx teeth. Moist shades, Can. to Car. 1—4f.

4 **S. áspera** Mx. Slender, hispid; leaves pointed, sharp-serrate; calyx glabrous, teeth hispid, equalling the corolla tube. Damp soils: common. 2f. Not leafy.

5 **S. cordàta** Rid. Stout, with large, pointed leaves, crenate-dentate; calyx teeth triangular, much shorter than the corolla. ♃ Shady banks, W. 2—5f.

6 **S. arvénsis** L. Weak, diffuse; lvs. ovate-cordate, obtuse; bracts very short; cal. teeth lanceolate; corolla tube included, lips short. ① Waste grounds, N.: rare. §

42. BETÓNICA, Tourn. BETONY. Calyx tubular-bell-form, with 5 awn-like teeth. Cor. as in Stachys, but beardless inside. Stam. ascending parallel beneath the galea. Style bifid. Lower leaves long petioled, cordate, all crenate. Verticils large, dense, in a terminal spike.

1 **B. officinàlis** L. *Wood B.* Spike interrupted at base; flowers purple, cor. twice longer than calyx (7′′), galea entire. Gardens, and escaped. 1f. Rare. § Europe.

2 **B.** GRANDIFLÒRA. Villous; floral leaves clasping; verticils separate; corolla violet, large (15′′), handsome, galea obcordate, glabrous. Gardens. 2f. Siberian.

43. LEONÙRUS, L. MOTHER-WORT. Calyx 5–10-striate, 5-toothed, teeth subspinescent. Upper lip of the corolla entire, hairy, concave, erect, lower lip 3-lobed, the middle lobe obcordate. Stam. 4, ascending beneath the upper lip. Mostly ♃. Verticils axillary. Flowers purplish. Summer.

1 **L. Cardìaca** L. Lvs. palmate-lobed, 3-fid, to lanceolate; corolla longer than the calyx, a hairy ring within. About dwellings. 3—5f. § Asia.

2 **L. marrubiástrum** L. Leaves oblong-ovate, coarsely cut-serrate; cor. shorter than the calyx teeth, naked within. Waste grounds. 2—4f. § Europe.

44. MARRÙBIUM, L. HOARHOUND. Cal. tubular, 5–10-striate, with 5 or 10 subequal teeth. Cor. upper lip erect, flattish or concave, entire or bifid, lower lip spreading, 3-lobed, middle lobe broadest, emarginate, tube included. Stam. included in the tube. ♃ Fls. in dense verticils, white.

M. vulgàre L. Hoary-pubescent; lvs. roundish, ovate, crenate-dentate, downy canescent beneath; cal. of 10 setaceous, hooked teeth. Fields, &c. 1—2f. Jn., Jl. § Eur.

45. LEONÒTIS, Br. LION'S-EARS. Calyx 10-veined, apex incurved, throat oblique, sub-10-toothed, upper tooth largest. Cor. tube exserted, upper lip concave, erect, entire, lower short, spreading, trifid. Sta. 4, under the galea, anth. in pairs.—Vert. dense, with numerous lin.-subulate bracts.

L. nepetæfòlia Br. Erect, stout; lvs. thin, ovate, crenate, on slender petioles; cal. teeth 8, spinescent; whorls very large; cor. scarlet, 10′′. ① Fields, S. 4—7f. § Afr.

ORDER XCII. BORRAGINACEÆ. BORRAGEWORTS.

Herbs (shrubs or trees), with round stems and branches, not aromatic. *Leaves* alternate, generally rough, with stiff hairs. *Stipules* none. *Flowers* seldom yellow, generally in a coiled (scorpoid) inflorescence. *Sepals* 5. *Petals* 5, united below, regular, very rarely irregular. *Stamens* 5, inserted in the tube. *Ovary* deeply 4-lobed, forming in *fruit* 4 separate, 1-seeded achenia in the bottom of the persistent calyx. Figs. 141, 455.

I. EHRETIEÆ. Ovary entire, style terminal. Fruit 4-seeded, fleshy. Shrubs...(*a*)
  a Calyx 4–5-toothed, in heads. Corolla funnel-form, white. Fla. and †..........CORDIA *bullata*.
  a Calyx 4–5-toothed, in corymbs. Corolla funnel-form, white. Fla.............EHRETIA *Beurreria*.
  a Calyx 5-parted, in secund spikes. Corolla salver-form, pale..................TOURNEFORTIA. 1
II. HELIOTROPEÆ. Ov. entire, style terminal. Fr. dry, separating into parts...(*b*)
  b Corolla tube cylindrical, throat open. Fruit separating into 4 parts..........HELIOTROPIUM. 2
  b Corolla tube conical, throat constricted. Fruit separating into 2 parts.........HELIOPHYTUM. 3
III. BORRAGEÆ. Ovary deeply 4-lobed, style basilar. Fruit 4 achenia...(*c*)
  c Corolla irregular, blue,—*d* having the border obliquely lobed..................ECHIUM. 4
    —*d* having the slender tube bent..........................LYCOPSIS. 5
  c Corolla regular in both tube and border...(*e*)
    e Achenia armed with barbed prickles.—*f* Corolla salver-form...............ECHINOSPERMUM. 6
      —*f* Corolla funnel-form..............CYNOGLOSSUM. 7
    e Achenia unarmed. Corolla throat closed by scales...(*g*)
      g Corolla wheel-form, no tube. Anthers exserted.........................BORRAGO. 8
      g Corolla wheel-form, a very short tube. Anthers included..............OMPHALODES. 9
      g Corolla tubular-bell-form, white. Style exserted.......................SYMPHYTUM. 10
      g Corolla funnel-form, blue. Stamens included...........................ANCHUSA. 11
    e Achenia unarmed. Corolla throat not closed with scales...(*h*)
      h Corolla tubular, with erect, acute lobes, white........................ONOSMODIUM. 12
      h Corolla lobes rounded, convolute in the bud..........................MYOSOTIS. 13
      h Corolla lobes rounded, imbricate in bud,—*k* white or yellow...........LITHOSPERMUM. 14
        —*k* purple-blue.................MERTENSIA. 15

1. TOURNEFÓRTIA, L. SUMMER HELIOTROPE. Cal. 5-parted. Cor. salver-form, throat naked. Sta. 5, included. Sty. short. Fr. 2-carpelled, 4-celled and 4-seeded. ♄ ♄ With entire leaves and secund spikes.

1 T. HELIOTROPOÌDES Hook. Shrubby at base, erect, hairy, with oval obtuse wavy-edged leaves; ped. terminal, 2 or 3 times forked, with numerous small inodorous, pale-lilac, pretty flowers. Buenos Ayres.

2 T. gnaphaloìdes, all white-silky, and **T. volùbilis,** climbing; in S. Fla.

2. HELIOTRÒPIUM, Tournef. HELIOTROPE. Calyx 5-parted. Cor. salver-form, throat open, folded between the lobes. Anth. sessile. Sty. short, stigma conical, the achenia cohering at base, at length separable. ♃ ♄ Fls. white or purple, in 1-sided, scorpoid spikes. Summer.

§ Flowers white, in forked terminal spikes, or single lateral ones........... Nos. 1, 2
§ Flowers white-purple, in a cluster of terminal spikes. Cultivated.........Nos. 3, 4

1 H. Europæum L. Erect, pubescent; lvs. oval, veiny, obtuse, petiolate; calyx spreading in fruit, hairy. ① Rocky banks, moist fields, Va., and N.: rare. 8—12′. §

2 H. Curassávicum L. Glabrous, ascending; leaves linear-oblong to spatulate, obtuse, tapering to base, veinless and glaucous. ① Shores, W. and S. 1f.

3 H. PERUVIÀNUM. Shrubby, erect, pubescent; leaves rugous, lance-ovate, short-petiolate; corolla twice longer than the calyx, peculiarly fragrant. Peru.

4 H. CORYMBÒSUM. Pubescent, with lance-oblong leaves tapering both ways; flowers deep purple, less fragrant, but larger than in No. 3.

3. HELIÓPHYTUM, DC. Calyx 5-parted. Cor. salver-form, throat constricted, 5-rayed. Anth. included. Sty. very short. Nuts 2, each 2-celled (sometimes with 2 additional empty cells).—Herbs with habit of Heliotrope.

H. Indicum DC. Erect, branching, hairy; lvs. ovate, erose-serrulate, acute, veiny, rugous, abrupt or subcordate at base; spike terminal, single (rarely forked); corolla much exserted; fruit with four empty cells. ① Fields, W. and S. 1—2f. §

4. ÉCHIUM, Tourn. VIPER'S BUGLOSS. Calyx 5-parted, segm. subulate, erect. Cor. campanulate, obliquely and unequally lobed, with a short tube and naked throat. Stigma cleft. Achenia tuberculate, base flat. Flowers irregular, in spicate, panicled racemes. Summer.

E. vulgàre L. Plant rough with bristles and tubercles; lvs. lanceolate; fls. large, handsome, violet-blue, many and crowded. ① Fields, Pa. to Va. 1½f.

5. LYCÓPSIS, L. WILD BUGLOSS. Calyx 5-cleft. Cor. funnel-form, tube incurved, throat closed with ovate, converging scales. Ach. perforated at base, ovoid, angular. ① Distinguished mainly by the curved cor. tube.

L. arvénsis L. Plant hispid, erect, branched above, with lanceolate, repand-denticulate leaves; flowers small, sky-blue with white scales, the bent tube longer than the calyx, in leafy racemes. Fields and waysides. 1f. § S. Europe.

6. ECHINOSPÉRMUM, Swartz. BURR-SEED. Calyx 5-parted. Cor. hypocrateriform, throat closed with concave scales. Ach. erect, bearing 1—3 rows of echinate prickles, smooth between, compressed or angular, fixed to a central column.—Herbs with bracted racemes and small blue fls.

E. Láppula Lehm. Branched above; lvs. hairy, lanceolate to linear; corolla longer than calyx, border concave; ach. with prickles in two rows. ① Dry soils. 1f. July.

7. CYNOGLÓSSUM, Tourn. HOUND'S TONGUE. Cal. 5-parted. Cor. short, funnel-form, concave, throat closed by 5 converging, convex scales. Ach. covered with echinate prickles, depressed, forming a broad pyramidal fruit, each fixed laterally to the style. Lvs. large. Cor. blue, purple or white.

§ Racemes without bracts, or nearly so....................................Nos. 1, 2
§ Racemes bracted at base, but the pedicels always extra-axillary..............No. 3

1 **C. officinàlis** L. *Common H.* Silky-pubescent, leafy to the top; leaves oblong-lanceolate, the upper sessile; naked racemes panicled; corolla dull purple. ♃ Pastures, &c. 1—2f. Plant dull green, ill-scented. July. § Europe.

2 **C. Virgínicum** L. Plant hairy, leafless above, with oblong-oval lvs. below, and a terminal cluster of short spikes of pale-purple flowers. ♃ Woods, Va., N. and W.

3 **C. Morrisòni** DC. *Beggar-ticks.* Rough-pubescent, widely-branched; leaves acuminate; racemes forked; flowers very small, white; fruit with doubly barbed prickles adhering to all that pass. ① Rocky places. 2—3f. July.

8. BORRÀGO, Tourn. BORRAGE. Cal. 5-parted. Cor. rotate, with acute segments, a scale at base of each. Sta. converging. Ach. ovoid, muricate, excavated at base, inserted lengthwise into an excavated recep.—Eur.

B. OFFICINÀLIS. Rough-haired, branching; leaves ovate; flowers sky-blue, showy, in terminal, loose racemes. ② In old gardens, sowing itself. 1—2f. All Summer.

9. OMPHALÒDES, Tourn. NAVELWORT. Calyx deeply 5-parted.

Cor. rotate, tube shorter than the calyx tube, throat closed. Sta. included. Achenia cup-form, toothed at the edges.—Oriental herbs.

1 **O.** LINIFÒLIA. Erect, smooth, glaucous; leaves obovate to linear-lanceolate; corolla white, twice longer than calyx. ① Spain. 1f. June—August.

2 **O.** VERNA. Runners creeping; leaves cordate to ovate, puberulent; racemes in pairs, few-flowered; flowers bright blue. ♃ S. Europe. 6′. April, May.

10. **SÝMPHYTUM,** Tourn. COMFREY. Cal. 5-parted. Cor. tubular-campanulate, orifice closed with 5, subulate scales, converging into a cone. Ach. smooth, ovoid, fixed by an excavated base. ♃ Oriental herbs.

S. officinàle L. Stem hairy, winged with the decurrent, lance-ovate leaves; fls. white or pink, in revolute racemes. Gardens and fields. 2—4f. Summer.

11. **ANCHÙSA,** L. BUGLOSS. Cal. 5-parted. Cor. funnel-form, throat closed with 5 scales. Sta. included. Achenia excavated at base.—Europe.

A. ITÁLICA. Plant bristly-hispid, with lanceolate leaves and panicled racemes of numerous bright-blue, small mellifluous flowers. A hardy biennial. Summer.

12. **ONOSMÒDIUM,** Mx. Cal. deeply 5-parted, with linear segments. Cor. cylindrical, having a ventricous, half 5-cleft limb, with the segments converging and the throat open. Anth. sessile, included. Style much exserted. Achenia whitish, shining. ♃ North American. Racemes terminal, subspicate, one-sided. Flowers white. Summer.

1 **O. Virginiànum** A. DC. Very rough with appressed, stiff bristles; lvs. oblong, sessile, 5-veined; cor. hispid, ⅓ longer than the lance-linear sepals, the segm. lance-subulate; anthers arrow-shaped. Dry soils. 15—30′. Corolla 4—5″.

2 **O. Caroliniànum** DC. Shaggy with long, spreading, rusty-white bristles; leaves lance-oblong, 7-veined; flowers shaggy-bristly; corolla near twice longer than sepals, the segments ovate, obtuse. By streams, M., W., S. 2—4f.

3 **O. molle** Mx. Hoary with soft appressed hairs; lvs. oblong-ovate; corolla hirsute, lobes triangular, pointed. Dry soils, W. 2—3f.

13. **MYOSÒTIS,** Dill. FORGET-ME-NOT. Cal. 5-cleft. Cor. salver- or funnel-form, tube about equalling the calyx, the 5 lobes convolute in bud, throat closed with short, concave scales. Ach. ovate, smooth, with a small cavity at base.—Herbs slightly villous. Racemes bractless, or with a few small leaves at the base. Flowers never axillary. May—Aug. Fig. 455.

§ Racemes one-sided. Calyx clothed with minute, appressed hairs, if any......No. 1
§ Rac. two-sided. Calyx beset with spreading, minutely-hooked bristles....Nos. 2, 4

1 **M. palùstris** Roth. Roughish-downy, or nearly smooth, branching; leaves lance-oblong, obtuse; ped. spreading, longer (2—3″) than the equal cal.; cor. 2—3″ broad, blue, with a yellow centre. ♃ Gardens; from Europe, also escaped in fields, &c.

β. ***laxa*,** taller (1f), very slender; lvs. lin.-obl.; ped. 4—6″ long. Swamps, ditches.

2 **M. arvénsis** L. Rough with tubercled hairs, branched; leaves oblong-lanceolate, acute; rac. loose, naked; ped. twice as long as the open, equal cal. ② Fields. 6—15′

3 **M. verna** N. (stricta Link.) Rough-bristly, with spatulate to lin.-oblong lvs.; ped. ascending, as long as the closed, bilabiate calyx; racemes leafy at base. ① Dry hills.

4 **M. versícolor** Pers. Stem very slender, hispid-villous; leaves oblong; racemes leafless; pedicels shorter than the deeply and equally 5-cleft calyx; flowers yellow, varying to blue. Del. (Canby, Porter). § Europe. The true Forget-me-not.

14. **LITHOSPÉRMUM,** L. GROMWELL. PUCCOON. Cor. funnel- or

salver-form, limb 5-lobed, orifice open, with or without appendages, anth. included. Stig. obtuse, bifid. Ach. bony, rugous or smooth, flat at base. —Herbaceous or suffruticous, generally with a thick, reddish root. Flowers spiked or racemed, bracted, white or yellow.

§ Achenia rugous-tubercled. Corolla throat open, not appendaged, white.......No. 1
§ Achenia smooth and white. Corolla throat appendaged.—*a* Fls. white...Nos. 2—4
—*a* Fls. yellow..Nos. 5—7

1 **L. arvénse** L. *Wheat-thief.* Leaves linear-lanceolate, obtuse, hairy; calyx nearly equal to the corolla, with spreading segments. ① A rough weed in fields. 1f—18′. Root reddish. Fls. small, solitary in the upper axils. May, June. § Europe.

2 **L. officinàle** L. Erect, very branching above; lvs. lanceolate, acute, veiny; calyx nearly equal to the tube of the corolla. ♃ Dry soils, N. and M. 1—2f. Flowers small, pedicellate, in recurved, leafy racemes. July. § Europe.

3 **L. latifòlium** Mx. Rough, erect, subsimple; leaves ovate, sessile, pointed both ways; racemes leafy, sepals lance-linear. ♃ Thickets, N. Y. to Va., and W. 2f.

4 **L. angustifòlium** Mx. Ascending, much branched; leaves linear, rigid; flowers scattered; corolla hardly exserted. ♃ Sandy banks, W. 6—15′. Leaves 1′.

5 **L. canéscens** Lehm. *Puccoon.* Erect, subsimple, soft-villous; leaves oblong or linear-oblong, obtuse; stem revolute at top, with the showy orange-yellow flowers axillary. ♃ Fields, prairies, N. Y., W. and S. 8—12′. June, July.

6 **L. hírtum** Lehm. Erect, simple, rough-haired; lvs. lance-linear, the floral lance-ovate; corolla twice longer than the linear sepals. ♃ Pa., W. and S. 8—15′. May.

7 **L. longiflòrum** Spr. Slender, simple, cinereous-strigous; leaves linear; corolla tube 4 times longer than the calyx (9—12″). Plains, W. 10—15′. July.

15. **MERTÉNSIA,** Roth. SMOOTH LUNGWORT. Calyx short, 5-cleft. Cor. tube cylindric, limb subcampanulate, 5-cleft, throat open, often with 5 folds or ridges between the insertion of the stamens. Sta. inserted at top of the tube. Ach. smooth or reticulated. ♃ St. and lvs. usually glabrous, pellucid-punctate, the radical many-veined, cauline sessile. Rac. terminal.

1 **M. Virgínica** DC. Ascending, very smooth; root leaves large, obovate to ovate, stem leaves sessile, lance-oblong, all entire, obtuse; fls. somewhat trumpet-shaped, pendent, 10″, blue to lilac, very handsome. Rich soils, N. Y., S. & W. 1—1½f. May. †

2 **M. marítima** Don. Glabrous, weak; lvs. ovate, obtuse, fleshy, glaucous; corolla twice longer than calyx, blue-purple. Sea-shore, N. H., and N.: rare.

3 **M. paniculàta** Don. Scabrous, erect; lvs. acuminate, cordate-ovate to oblong; corolla thrice longer than calyx, blue to white. Lake Superior, and N. †

ORDER XCIII. HYDROPHYLLACEÆ. HYDROPHYLLS.

Herbs mostly, with alternate-lobed leaves and regular bluish flowers. *Calyx* 5-cleft, usually with appendages at the clefts, persistent, free. *Corolla* 5-lobed, often with 10 honey scales or furrows near the base. *Stamens* 5, inserted into the corolla, with a deeply bifid style. *Ovary* entire, ovoid, free, 1-celled, with 2 parietal, several-seeded placentæ. *Fruit* 2-valved, filled by the placentæ. *Seeds* reticulated, albuminous.

§ HYDROPHYLLEÆ. Ovary and pod 1-celled. Style bifid. Leaves cleft...(*a*)
§ HYDROLEÆ. Ovary and pod 2-celled, ∞-seeded. Styles 2. Leaves entire...(*e*)
a Lobes of the corolla convolute in the bud...(*b*)
a Lobes of the corolla imbricate (quincuncial) in the bud...(*c*)

b Stamens exserted. Flowers in forked, revolute cymes....................Hydrophyllum. 1
b Stamens included. Flowers solitary, opposite the leaves....................Nemophila. 2
c Flowers solitary. Calyx enlarged in fruit....................Ellisia. 3
c Flowers racemed.—*d* Lobes of the corolla fringe-toothed....................Cosmanthus. 4
—*d* Lobes of the wheel-bell-form corolla entire....................Phacelia. 5
—*d* Lobes of the tube-bell-form corolla entire....................Whitlavia. 6
e Corolla wheel-bell-form. Leaves ordinary, with soft hairs....................Hydrolea. 7
e Corolla funnel-form. Leaves large, with stinging hairs....................Wigandia. 8

1. **HYDROPHÝLLUM,** Tourn. Water-leaf. Burr-flower. Sepals slightly united at base. Corolla bell-form, convolute in bud, with 5 double folds (nectaries) inside. Sta. exserted. Caps. globous, 1-celled, 2-valved, 4-seeded, 3 of the seeds mostly abortive. Placentæ 2, fleshy, free except at the base and apex. ♃ Leaves large, long-stalked, pinnately or palmately veined, cauline alternate. Cymes scorpoid, bractless.

§ Calyx appendaged between the sepals at base. Stamens as long as the cor...No. 1
§ Calyx not appendaged. Filaments much exserted....................Nos. 2—4

1 **H. appendiculàtum** Mx. Hairy; lvs. palmately 5-lobed, the lower pinnately divided, lobes pointed and toothed; sta. often included; appendages deflexed, much shorter (1″) than sep. (4—5″); cor. blue. Woods, N. Y. to Wis., & Va. 1—1½f. May.

2 **H. Virgínicum** L. Nearly smooth; leaves pinnatifid; segments oval-lanceolate, pointed, incised, the upper 3 confluent; petioles long; ped. still longer, bearing a roundish tuft of pale flowers with hirsute calyxes. Moist woods. 1f. June.

3 **H. Canadénse** L. Lvs. smoothish, palmate, roundish, with 5—7 shallow lobes, unequally dentate, teeth obtuse-mucronate; fls. in crowded fascicles; ped. shorter than the forked petioles; cor. white or purplish. Alpine woods. 1—1½f. June, Jl.

4 **H. macrophýllum** N. Whitish, with reversed hairs; leaves oblong-oval in outline, pinnatifid, and cut into blunt-mucronate teeth; cymes dense, globous, on long peduncles; corolla white, 6″; stamens 10″. Rocky woods, W. and S. 1f. June.

2. **NEMÓPHILA,** N. Cal. 5-parted, the sinuses with reflexed appendages. Cor. wheel-bell-form, lobes rounded, convolute in bud, tube with 5 pairs of folds within. Sta. included. Ov. and caps. as in Hydrophyllum, the placentæ each 2–12-ovuled. ① Tender and fragile, with pinnately-parted leaves and solitary, showy flowers.

* Leaves all or the lower alternate. Flowers not spotted....................Nos. 1, 2
* Leaves all opposite. Flowers spotted with blue or brown....................Nos. 3, 4

1 **N. microcàlyx** F. & M. Smooth; leaves triangular, 5-3-cleft, with rounded, mucronate teeth; ped. and petioles slender; corolla 1—2″, white, calyx still smaller; seeds 1 or 2. Damp woods, S. 3—12′, very weak. April.

2 **N.** INSÍGNIS. Lvs. oblong, with 7—9 ovate, acute lobes, shorter than peduncles; fls. 1′ or more broad, the border pure blue with a white centre. California.

3 **N.** MACULÀTA. Leaves 3-7-lobed, tapering and entire at base; flowers on long ped., 1½′ broad, white, with a violet spot on the apex of each lobe. California.

4 **N.** ATOMÀRIA. Leaves and peduncles nearly as in the last; flowers white, 10—12″, sprinkled all over with small brown spots. Sierra Mountains.

3. **ELLÍSIA,** L. Cal. 5-parted, equalling the tubular-bell-form corolla, enlarged in fruit. Cor. tube minutely appendaged within. Sta. included. Caps. 2-valved, 4–2-seeded. Leaves pinnatifid, flowers white, May—July.

E. Nictelæa L. Weak, slender; lvs. petiolate, the upper alternate, lobes 9—11, lin.-oblong; ped. 1-flowered, with calyx larger than corolla. Woods, Pa., W. and S. 1f.

4. **COSMÁNTHUS,** Nolte. MIAMI MIST. Cal. 5-parted. Cor. wheel-bell-form, tube not appendaged, lobes delicately fringe-toothed, as long as the stamens. Ovary hairy. Capsule 2-valved, 4-seeded. ① Delicate, with alternate leaves and small pale flowers in long, bractless racemes.

1 **C. Púrshii** Wood. Nearly smooth, erect; lvs. pinnatifid, the upper sessile, lobes 5—7, oblong, acute; rac. 9-15-flowered; pedicels longer than the lance-linear, ciliate sepals; fls. light blue, 5—6″. River bottoms, Ill., Ky., to Ga. 8—12′. May, June.

2 **C. fimbriàtus** Mx. Pubescent; stems clustered, assurgent; leaves pinnate, with 5—7 roundish or oblong-obtuse lobes; pedicels as long as the oblong-spatulate, obtuse sepals; corolla white, 4—5″. Mountains, Tenn., Va., to Ga. May.

5. **PHACÈLIA,** L. Cal. not appendaged. Corolla tubular-bell-form, lobes entire, imbricate in bud, tube appendaged within. Sta. 5, generally exserted. Ov. and caps. hispid, ovoid, 4-∞-seeded.—Herbs hispid, with alternate leaves and 1-sided racemes. May, June.

§ Capsule 4-seeded. Corolla tube evidently appendaged within.............Nos. 1—3
§ EUTÒCA. Caps. (or ovary) 8-∞-seeded. Cor. obscurely appendaged...(*a*)
 a Seeds or ovules 6—8. Racemes simple. Native South.. ....Nos. 4—6
 a Seeds or ovules 20 or more. Rac. forked or corymbed. Gardens. ①..Nos. 7—9

1 **P. bipinnatifìda** Mx. Stem hairy, suberect, much branched; lvs. cut-pinnatifid, long-petioled, segm. again incised; rac. forked or simple, loose; corolla twice longer than calyx, 6″, blue. ② Hilly woods, Ill. to N. C. and Ala. 1—2f.

2 **P.** TANACETIFÒLIA. Hispid or hairy, tall, with pinnatisect leaves, long, dense racemes, corollas blue, and long, exserted stamens. California. 1—2f.

3 **P.** CONGÉSTA. Hoary-pubescent; lvs. pinnate with very unequal alternate-cut lfts.; racemes loose, spicate; flowers small, blue; stamens little exserted. California. 1f.

4 **P. parviflòra** Ph. Stems smoothish, weak; lvs. all petiolate, pinnatifid or 3-fid, lobes distant, small; fls. 4″, pale; sep. smoothish. ② Shady banks, Pa., and S. 9′.

5 **P. maculàta** Wood. Erect, branched, sparingly hirsute; lvs. pinnatifid, 5-7-lobed, lower petiolate, upper sessile; fls. 7″, violet-blue, 10-spotted around the yellow throat; sepals bristly-ciliate, linear-oblong. ② Stone Mountain, Ga., and W. 6—12′.

6 **P. pusílla** Buckley. Pubescent; leaves sessile, pinnatifid, lobes abruptly pointed; fls. pale-blue or white; sepals linear-oblong; stamens exserted. Prairies, Ala.

7 **P. Franklínii** Gray. Soft-hairy, erect; lvs. bipinnatifid with crowded lobes; racemes short, dense, crowded, with blue fls. Isl. Royal (Porter) to Oreg.! Cultivated.

8 **P.** VÍSCIDA. Viscid with glandular hairs, ovate, coarsely-toothed leaves, and long, revolute racemes, uncoiling as the large (9″) purple-blue flowers expand. Cal. 1f.

9 **P.** MENZIÈSII. Lvs. linear, entire, or the lower with few linear-oblong lobes; flowers sessile, light-blue, in short spikes. Oregon.

6. **WHITLÀVIA,** Harvey. Cal. 5-parted. Cor. tubular-campanulate, the 5 lobes abruptly spreading, throat slightly contracted. Sta. exserted. Capsule ∞-seeded. ① From Texas and California.

W. GRANDIFLÒRA. Some viscid, with broad, ovate, petiolate, coarsely-toothed leaves, loose racemes of large (1′) deep-blue (or white) bell-shaped flowers. June—October.

7. **HYDRÒLEA,** L. Sep. 5. Cor. rotate-campanulate, 5-lobed, bearing the 5 stamens. Styles 2, distinct. Capsule 2-celled, 2-valved, the placentæ large, with ∞ minute seeds.—Herbs with entire leaves and cymes of blue flowers. July—September.

1 **H. corymbòsa** Macbride. Not spiny, some hairy above; lvs. lance-ovate, sessile; branchlets corymbed, each with a terminal, showy, azure flower. Ponds, S. 1—2f.

2 **H. quadrivàlvis** Walt. Spiny, hispid; leaves lanceolate, petiolate; cymes 4-6 flowered; cor. azure-blue, 5—6″ broad; sep. ovate. Slow waters, S. C., and W. 2f.

8. **WIGÁNDIA**, H. B. K. Cor. funnel-form.—Herbs with large leaves.

W. CARACASÀNA. Half-shrubby, with ovate-cordate, doubly-crenate, variegated, ample leaves, stinging hairs, and revolute spikes of small flowers. S. Am. Greenhouse.

ORDER XCIV. POLEMONIACEÆ. PHLOXWORTS.

Herbs with alternate or opposite leaves and 5-parted, regular, showy flowers. *Corolla* monopetalous, the lobes convolute, rarely imbricate in æstivation. *Stamens* 5, adherent to the corolla tube, and alternate with its lobes. *Ovary* 3-celled. *Stigma* 3-cleft. *Capsule* 3-celled, 3-valved, loculicidal. *Seeds* few or many, albuminous, attached to a permanent columella. Fig. 46.

I. POLEMONIEÆ. Sepals united at base. Lobes of the corolla convolute in bud...(*a*)
II. DIAPENSIEÆ. Sepals distinct, oval. Lobes of the corolla imbricated in bud....DIAPENSIA. 7
  a Stamens unequal, included in the tube of the salver-form corolla..................PHLOX. 1
  a Stamens unequal, in the tube of the funnel-form (scarlet) corolla..................COLLOMIA. 2
  a Stamens equal and protruded from the corolla tube. Seeds ∞...(*b*)
    b Leaves undivided, opposite. Corolla wheel-funnel-form, dentate..............FENZLIA. 3
    b Leaves variously divided. Ovary and pod ∞-seeded...(*c*)
      c Stamens equal and straight. Corolla of various forms...................GILIA. 4
      c Stamens declined in the bell-form corolla.—*d* Low herbs...................POLEMONIUM. 5
        —*d* Climbing shrubs.............COBÆA. 6

1. **PHLOX,** L. PHLOX. LYCHNIDEA. Calyx prismatic, deeply 5-cleft. Corolla salver-form, the tube more or less curved. Sta. very unequally inserted, and included in the tube. Caps. 3-celled, cells each 1-seeded.—A highly ornamental North American genus. Lvs. mostly opposite, sessile, simple, entire. Fls. in terminal cymes, corymbed or panicled. Fig. 46.

* Lobes of the corolla rounded and entire at the end...(1)
  1 Panicle of cymes oblong or pyramidal, many-flowered..................Nos. 1, 2
  1 Panicle of cymes corymbed, level-topped, flowers fewer...(2)
    2 Plants glabrous. Calyx teeth shorter than its tube.....................Nos. 3, 4
    2 Plants hairy. Calyx teeth attenuated, longer than the tube...(3)
      3 Leaves narrow, linear, or nearly so..........................Nos. 5, 6
      3 Leaves broad, ovate or lanceolate, &c......................Nos. 7, 8 β, 9
* Lobes of corolla notched or bifid at the end.—4 Leaves distant...........Nos. 8, 10
  —4 Leaves imbricated..........No. 11

1 **P. paniculàta** L. Smooth, erect; leaves oblong- or ovate-lanceolate, pointed at each end; fls. numerous, in a terminal panicle, pink-purple, varying to white; calyx teeth setaceous-pointed. ♃ Shady banks, Penn., W. and S. 2—3f. July—Sept. †

β. ***acuminàta.*** Lvs. ovate-acuminate, downy beneath; stem hairy.

2 **P. maculàta** L. Stem roughish, purple-spotted, upright; leaves thickish, lanceolate, the upper ovate-cordate; fls. many, purple, in an oblong panicle; calyx teeth lanceolate, acute. ♃ Moist fields, Penn. to Car., and W. 2—3f. June—August.

β. ***gracìlior.*** Tall, slender, rough; leaves lance-linear and linear. Ga. (Feay).

γ. ***suavèolens.*** Smooth; flowers white, sweet-scented. Gardens.

3 **P. Carolìna** L. Ascending, often branched; leaves lanceolate, rounded at base, pointed; fls. rose-purple, in small, dense cymes. ♃ Prairies, woods, Pa., W. and S. 9′—2f. May—July.—β. ***ovàta*** has roughish stems and ovate leaves.

4 **P. glabèrrima** L. Slender, erect; leaves oblong- to lance-linear, taper-pointed, thick, with rolled margins; calyx teeth sharp-pointed; corollas pale-pink, few. ♃ Prairies and barrens, Wis. to Ga. 1—3f. June, July.

5 **P. pilòsa** L. Ascending, slender, glandular-hairy above; lvs. lanceolate to linear, attenuate to an acute apex; corymbs loose; calyx teeth bristle-pointed, much longer than the tube; corolla small. ♃ Wis. to N. J., and S. May, June.

β. ***Floridàna.*** Leaves oblong-lanceolate; calyx teeth lance-setaceous. Fla.

6 **P. involucràta** Wood. Hoary-pubescent, branched and ascending at base; lvs. linear-oblong, rather obtuse, clasping, flat, the floral similar and closely subtending the dense corymbs as if *involucrate;* calyx teeth linear or subulate-spatulate; flowers purple to carmine. ♃ Dry soils, S. 6—12′. May, June.

7 **P. reptans** Mx. Assurgent, with creeping stolons; lvs. obovate to ovate, obtuse; fls. few; sep. linear-subulate; cor. blue-purple. ♃ Hills, Ind. to Pa., and S. 9′. Jn.

8 **P. divaricàta** L. Low, diffuse, downy; lvs. ovate to lance-oblong, acute; flowers grayish-blue, lobes notched; sep. lin.-subulate. ♃ N. Y. to Wis., and S. 1f. Apr., May.

β. ***Laphàmii.*** Leaves ovate; corolla lobes obtuse, entire. Wis. (Lapham).

9 **P. Drummóndii** Hook. Upright, forking, glandular-hairy; lvs. lanceolate to oblong, mostly alternate; sepals lance-setaceous, revolute; flowers in dense corymbs, all shades in the gardens, white to purple, with a star. ① Ga.! to Texas.

10 **P. bífida** Beck. Low, assurgent, diffuse; lvs. lance-ovate to lance-linear; fls. few, sepals linear, petals deeply bifid, purple. ♃ Ill. to Mo.: rare. 6′. April.

11 **P. subulàta** L. *Moss Pink.* Procumbent, much branched and very leafy, in tufts; leaves rigid, linear to subulate, fascicled; flowers pink to white, covering the tufts in May. 5—8′. Penn., S. and W., and in gardens.

2. **COLLÒMIA** coccínea. ① From Chili, has bright carmine-red fls. in heads subtended by broad bracts. Leaves ovate-lanceolate, often 3-cleft at apex, alternate. Pods 3-seeded. 10—15′. June, July.

3. **FÉNZLIA** dianthoìdes. ① California. A small pink-like herb, 3—6′, with exquisitely beautiful flowers, 1′, solitary, pink with 5 purple dots around a yellow eye, and the 5 lobes evenly notched at the end. Leaves linear, opposite.

4. **GÍLIA**, R. & P. Cal. teeth acute. Cor. funnel-form, the tube short or long, bearing the equal sta. more or less exserted and not declined. Pet. entire. Pod ∞-seeded.—Herbs with elegant, showy flowers.

§ Ipomópsis. Corolla tube long exserted, in thyrse-like racemes. Tall.........No. 1
§ Leptosìphon. Corolla tube long, slender, in involucrate heads. Low........No. 2
§ Eugília. Corolla tube included in the calyx, scattered or capitate.........Nos. 3, 4

1 **G. coronopifòlia** Pers. *Standing Cypress.* A splendid herb 2—4f, plume-like in form, closely beset with delicate pinnatifid lvs. and bearing at top a long (1f) thyrse of bright red flowers (15″). ② Sandy banks, S. C. to Fla., and W. July—Sept. †

2 **G.** androsàcea. Strict, simple, downy; lvs. opp., digitately 5-9-cleft into very narrow segments; cor. 1′ or more long, lilac, purple or white. ① Cal. 6—12′. May, Jn.

3 **G.** trícolor. Diffusely branched; lvs. 2-3-pinnatifid; flowers many, 3-colored, limb lilac, throat purple, tube yellow. A great favorite, from California.

4 **G.** capitàta, with the blue 6″ flowers at length in round dense heads. Cal. and Oreg.

5. **POLEMÒNIUM,** L. Greek Valerian. Calyx and corolla bell-form, with suberect segments. Stamens equally inserted, declined, hairy at base. Capsules 3-valved, 3-celled.—Herbs weak, with alternate pinnately-divided leaves and terminal cymes, blue to white.

1 **P. reptans** L. Diffusely branched; leaves 7-11-foliate, leaflets acute; fls. nodding; pod cells 2- or 3-seeded. ♃ Damp uplands, N. Y. to Wis., and S. 1—1½f. May.

2 P. cœrùleum. Tall, with erect branches; leaflets 11—17, pointed; fls. erect; seeds ∞. Swamps, Vt., N. Y., N. J. (Dr. Howe, Prof. Porter). 2—3f. Often cultivated.

6. COBǼA SCANDENS. Calyx large and leaf-like. Cor. large, throat ample, limb spreading, dull purple. Leaves pinnatisect, ending in a tendril. Coarse climbers, from Mexico. The lower leaf-segments resemble stipules.

7. DIAPÉNSIA, L. Cal. of 5 oval sepals, closely subtended by bracts. Corolla bell-form, imbricated in the bud. Fil. flat, arising from the sinuses of the corolla, anth. cells diverging at base and the dehiscence transverse. Caps. 3-celled, ∞-seeded. └ Prostrate, with densely imbricated, entire leaves and solitary terminal flowers.

§ DIAPÉNSIA *proper*. Anthers without awns. Flowers pedicellate..............No. 1
§ PYXIDÁNTHERA. Anthers with the lower valve awned. Flowers sessile......No. 2

1 D. Lappónica L. A little tufted shrublet, with fleshy, evergreen, obtuse leaves, and the tiny white fls. raised on pedicels 1′ long. White Mountains. 2—3′. July.

2 D. barbulàta Ell. Prostrate, creeping, forming dense beds, with short branches; flowers terminal, sessile; anth. short-awned at base. Barrens, N. J., and S. 3–6′. Jn.

ORDER XCV. CONVOLVULACEÆ. BINDWEEDS.

Chiefly twining or trailing *herbs*, sometimes parasitic, sometimes shrubby. *Leaves* (or scales when leafless) alternate. *Flowers* regular, pentamerous and 5-androus. *Sepals* imbricated. *Corolla* monopetalous, 5-plaited or lobed, convolute in bud. *Ovary* free, 2-(rarely 3-)celled or falsely 4-celled, or of 2 distinct, 1-ovuled pistils. *Capsule* 2–6-seeded. *Embryo* large, coiled in mucilaginous albumen. Figs. 48, 65, 81, 82, 209–10, 262.

III. CUSCUTINEÆ. Leafless, twining, orange-yellow parasites......................CUSCUTA. 11
II. DICHONDREÆ. Leafy. 2 distinct ovaries with 2 distinct styles...................DICHONDRA. 10
I. CONVOLVULEÆ. Leafy. Ovary 1. Capsule dehiscent. Seed-lobes leafy...(*a*)
  a Styles united into one...(*b*)
  a Styles 2 or 3, distinct or nearly so. Stamens included...(*z*)
    b Ovary and pod 4-celled.—*c* Stamens exserted. Flowers small...................QUAMOCLIT. 1
      —*c* Stamens included. Flowers large................BATATAS. 2
    b Ovary and pod 3-celled. Stigma capitate, granulate..........................PHARBITIS. 3
    b Ovary and pod 2-celled...(*d*)
      d Stigma 1, capitate.—*e* Stamens included................................IPOMŒA. 4
        —*e* Stamens exserted................................CALONYCTION. 5
      d Stigmas 2,—*x* ovate, flattened. S. Fla...........................JACQUEMONTIA *violacea*.
        —*x* linear-terete. Calyx not bracted..........................CONVOLVULUS. 6
        —*x* oblong-terete. Calyx in 2 large bracts..........................CALYSTEGIA. 7
    z Styles each bifid. Peduncle very short..EVOLVULUS. 8
    z Styles each simple. Peduncles longer than the leaves..........................STYLISMA. 9

1. QUÁMOCLIT, Tourn. CYPRESS-VINE. Sep. 5, mostly mucronate. Cor. tubular-cylindric, with a salver-form border. Sta. exserted. Style 1, stigma capitate, 2-lobed. Ov. 4-celled, cells 1-seeded. ʔ From Tropical Am.

1 Q. vulgàris Choisy. *Cypress-vine.* Lvs. pinnatifid to the midvein, segm. linear, parallel, acute; ped. 1-flwd.; sep. ovate-lanceolate; cor. scarlet. ① An exceedingly delicate vine, in gardens, and often escaped S. July, Aug. §

2 Q. coccínea Mœnch. Leaves cordate, acuminate, entire or angular at base; ped. elongated, about 5-flowered; càlyx awned; flowers light scarlet, limb nearly entire 9″ broad. ① Along rivers, S. and W. June—Aug. § †

2. **BATÀTAS,** Rumph. SWEET POTATO. Cal. of 5 sepals. Cor. campanulate, with a spreading limb. Stam. 5, included. Style simple, stigma capitate, 2-lobed. Capsule 4-celled, 4-valved, with 4 erect seeds. ♭ Herbs, or shrubby, with milky juice.

1 **B. littoràlis** Chois. Creeping, sending out runners; lvs. smooth, thick, sinuate with 3–5 rounded lobes and cordate at base; ped. 1-flowered, as long as the leaf; sep. abrupt-pointed; seeds tomentous; corolla white. ♃ Coast sands, S. Aug.—Oct.

2 **B. macrorhìza** Wood. Creeping or twining; lvs. cordate, lobed or entire, soft-downy beneath; ped. 1-5-flowered, shorter than the leaves; cor. purple; seeds villous. ♃ Sands, S. C. to Fla. Root very large. (Ipomœa Michauxii Swt.)

3 **B. édulis.** *Sweet Potato.* Lvs. 3-5-lobed or angled, lobes acute; ped. 3-5-flowered, as long as the petioles. ♃ W. Indies. Extensively cult. for its sweet tubers. Purple.

3. **PHÁRBITIS,** Chois. MORNING GLORY. Calyx 5-sepalled. Cor. bell-funnel-form. Sty. single, stig. capitate, granulate. Ov. 3-(rarely 4-)celled, cells 2-seeded. ♭ Beautiful, cultivated and spontaneous.

1 **P. purpùrea** Wood. Twining stem clothed with reversed hairs; lvs. cordate, entire; ped. 2-5-flowered; corolla large, dark purple, varying to blue, flesh-color, &c., appearing in long succession, in fields and gardens. June, July.

2 **P. Nil** Chois. Some hairy; leaves cordate, 3-lobed; ped. 1-3-flowered, shorter than the petioles; sepals ovate, long-pointed, corolla tube white, border indigo (*nil*) blue. Gardens, and in fields. July, Aug.

3 **P.** HEDERÀCEA, from S. Am., differs from P. Nil in the middle lobe of its lvs., which is ovate, and contracted at base; ped. 1-flwd.; cor. 2′ or more broad, varying in purple and blue, blue and white, pink and white, &c.—The hybrid P. LIMBÀTA has a purple star with a white border and leaves scarcely lobed. ①

4 **P.** LEÀRII, from Mexico, has ped. longer than the cordate, velvet-silky leaves, each bearing a cluster of magenta-blue-red flowers. Greenhouse. ♃. 10—15f.

4. **IPOMŒ̀A,** L. Cal. 5-sepalled. Cor. bell-funnel-form. Sta. included. Style 1, stigma capitate. Ov. and capsule 2-celled, cells 2-seeded.—Herbs, shrubs, or trees. Our species are herbs creeping or climbing.

* Flowers capitate, involucrate, small, blue. Sepals hairy........................No. 1
* Flowers separate.—*a* Sepals bristly ciliate, capsules somewhat hairy......Nos. 2, 3
—*a* Sepals glabrous.—*b* Flowers purple. Maritime......Nos. 4, 5
—*b* Flowers white, rarely yellow...Nos. 6—8

1 **I. tamnifòlia** L. Hairy; leaves ovate, cordate, acuminate, large, equalling the peduncles; fls. crowded, 9″, with linear bracts and sepals. ① Ga. to La. Jl.—Sept.

2 **I. commutàta** R. & S. Smoothish; lvs. cordate, entire or 3-lobed; ped. as long as the petioles; flowers 2—5, purple to pink, 18″; sep. 5″. ① Fields, S. July—Oct.

3 **I. lacunòsa** L. Puberulent; lvs. cordate, entire or angular-lobed; ped. ½ as long as the petioles; flowers 1—3, white, with a purplish rim, 1′, sepals ½ as long. ① Dry fields and hills, Penn. to Ill., and S. 2—6f. August, September.

4 **I. Pes-Capræ** Sw. Roughish; leaves roundish, emarginate or 2-lobed, thick; ped. as long as the petioles; fls. 1—5, purple, 3′ long. Coasts of Ga. and Fla. June +.

5 **I. sagittifòlia** (Mx.) Glabrous; lvs. cordate-sagittate; ped. as long as the petiole, much shorter than the one large (3′) purple flower. ♃ Marshes, S. June +.

6 **I. sinuàta** Ort. Lvs. palmately 7-cleft, varying to sinuate-lobed; segments pinnatifid; ped. 1- or 2-flowered; corolla white, 1′. ♃ Ga., Fla. 20f. July—October.

7 **I. ciliolàta** Pers. Leaves cordate, entire, acuminate; ped. 1-flowered, 2-bracted above; corolla large, yellow; sepals 8″ long. ♃ N. Car. and Tenn.

8 **I. panduràta** Meyer. *Wild Potato.* Leaves broad-cordate to panduriform; ped.

1-5-flowered, longer than the petioles; sepals ¼ as long as the corolla; corolla 3′, white with a purple centre. ♃ N. Y. to Ill., and S. July, August.

5. **CALONÝCTION** speciósum (or Ipomœa Bona-nox), Good-night, is a tall climber of the W. Indies and S. Fla., often cultivated in the greenhouse. Flowers 4—7 on each long peduncle, very large, funnel-form, white.

6. **CONVÓLVULUS**, L. Bindweed. Sep. 5. Cor. bell-form. Style 1. Stigmas 2, thread-form, often revolute. Ovary and capsule 2-celled, 4-seeded.—Herbs or shrubs, twining or erect.

1 **C. arvénsis** L. Prostrate or climbing; leaves arrow-shaped to ear-shaped; ped. bearing 1 small rose-white flower and 2 bracts. ♃ Fields: rare. June. §

2 **C.** trícolor. Stem weak, 1—3f high; leaves lance-obovate, sessile, shorter than the 1-flowered ped.; corolla yellow in centre, white next, border blue. ① Europe.

7. **CALYSTÈGIA**, Br. Calyx 5-parted, included in 2 leaf-like bracts. Cor. bell-form, 5-plicate. Style 1. Stigmas 2, obtuse. Capsule 1-celled, 4-seeded.—Herbs, with the flowers solitary.

1 **C. spithamæa** Br. Erect or assurgent, 6—8′ (a *span*) high; leaves lance-oblong, as long as the peduncles; flowers white. ♃ Can. to Penn., and W. June.

2 **C. Sèpium** Br. *Rutland Beauty.* Glabrous, twining; lvs. cordate-sagittate, lobes truncate; bracts cordate; flowers many, large, white with a reddish tinge. ♃ Hedges, thickets, Can. to Fla. 6—10f. May—July.

β. ***Catesbeiàna.*** Pubescent, with small leaves and short peduncles. S.

γ. ? ***paradóxa.*** Tomentous; bracts linear, remote from the flowers. (Pursh.)

8. **EVÓLVULUS**, L. Sep. 5. Cor. bell-, funnel-, or wheel-form. Sty. 2, each bifid. Ovary and capsule 2-celled, 4-seeded.—Herbs diffuse.

E. seríceus Swtz. Stem dividing at base into simple, filiform, procumbent branches; leaves lance-linear, sessile, 3-veined, silky beneath, 9″; ped. 1—2″, 1-flowered; corolla wheel-form, 5″, white. ♃ Prairies, Ga., Fla., to La. 1f.

9. **STYLÍSMA**, Raf. Sepals 5, equal. Corolla bell-form. Stamens included. Styles 2, rarely 3. Stig. capitate. ♃ Slender creepers.

1 **S. humistràta** (and aquática) Walt. Hairy or smoothish; leaves oval, oblong, or linear, obtuse or retuse both ways, on short petioles; ped. longer than the leaves, 3-(1—5-)flowered; bracts minute; styles less than ½ united; corolla 6—9″, white. Sandy soils, Va. to O., and S. 2—5f. Lvs. 12—18″. (S. evolvuloides Choisy.) Jn.–Sept.

2 **S. Pickeríngii** (Torr.) Leaves linear, narrowed to subsessile base; bracts leafy, equalling the flower; styles more than ½ united, otherwise as No. 1. N. J. to N. C.

10. **DICHÓNDRA**, Forst. Sep. 5, obtuse. Corolla bell-form, 5-cleft. Pistils 2, distinct. Capsules 2, utricular, 1-seeded. ♃ Prostrate.

D. repens Forst. Lvs. round-cordate or reniform, the petiole longer than the blade or the 1-flowered peduncles; calyx villous, larger (3″) than the whitish corolla (2″). Wet grounds, S. 3—12′. March—May.

11. **CUSCÙTA**, Tourn. Dodder. Fls. 5-(rarely 4-)parted. Corolla globular-bell-form. Sta. appendaged with scales or fringes at base. Styles 2. Caps. 2-celled, 4-seeded. ① Stems yellow to orange, thread-form, with minute scales for leaves, twining against the sun and living on other plants.

§ Stigmas filiform as well as the styles. Capsule regularly circumscissile……No. 1
§ Stigmas capitate. Capsule indehiscent or bursting irregularly…(*)

* Sepals distinct, with imbricated bracts added. Flowers sessile.......Nos. 2, 3
* Sepals united, bracts few and scattered. Flowers pedicellate...(*a*)
  a Corolla cylindrical, withering on the top of the capsule..........Nos. 4–6
  a Corolla bell-shaped, persistent at the base of the capsule...(*b*)
    b Lobes of the corolla acute or acuminate........................Nos. 7, 8
    b Lobes of the corolla obtuse...............................Nos. 9–11

1 **C. Epilìnum** Weih. *Flax D.* Fls. sessile in small, dense, remote heads; calyx 5-parted, scarcely shorter than the globular corolla or capsule. Flax fields. Jn. § Eur.

2 **C. glomeràta** Choisy. Fls. in compact masses surrounding the foster stem while its own filiform stems decay; sepals 1″, with many squarrous bracts; corolla white, 2″, tube-bell-form, 5-lobed. On the Compositæ, &c., W. and S.

3 **C. compácta** Juss. Fls. in large (1—2′) masses, with thick stems; sep. and 3–5 bracts minute (½″); cor. slender, with 5 oblong lobes. N. Y., W. and S., on shrubs.

4 **C. tenuiflòra** Eng. Pale, much branched, on high plants; fls. short-pedicelled; cor. tube slender, twice longer than the calyx or its own short obtuse lobes; capsule often but 1- or 2-seeded. Wet grounds, N. J., Pa., to Ill., and W.

5 **C. infléxa** Eng. Fls. pedicelled, mostly 4-parted; cor. fleshy, its lobes erect and inflexed, margins crenulate; capsule brown, capped with the dead corolla. Prairies and open woods, Ill. to Va. and Ga. On Hazel, Rhus, &c.

6 **C. decòra** Chois. Fls. pedicellate, 5-parted, large (1½″), fleshy, white; cor. broad-bell-form, lobes acute; capsule enveloped by the dead corolla. Wet, Ill. to Fla.

7 **C. chlorocárpa** Eng. Low, branching, orange; fls. 4-parted, short-pedicelled, 1″, bell-form, the lobes of cal. and cor. acute; caps. large, greenish. Wis. to Del., & S.

8 **C. arvénsis** Beyr. On low plants; flowers small (¾″), 5-parted, pedicellate; corolla tube shorter than its pointed lobes, or the rounded sepals. N. Y. to Ill., and S. Jn., Jl.

9 **C. obtusiflòra** H. B. K. Low, bright orange; fls. pedicell.. dotted with red glands (β. glandulosa); sep. round-obtuse; caps. 1½″. Mostly on Polygonum. Ga., S. and W.

10 **C. Gronòvii** Willd. Stems thick, often high-climbing; fls. mostly 5-parted, at length densely panicled; corolla tube bell-form, longer than the calyx, its lobes obtuse, entire, spreading. Common in all the country. Flowers 1⅓″.

11 **C. rostràta** Shutt. Fls. large (2—3″), in loose cymes; corolla deeply bell-form, lobes obtuse; capsule 2—3″, with a 2-pointed beak. Mountains, Md. to S. Car.

ORDER XCVI. SOLANACEÆ. NIGHTSHADES.

Plants herbaceous, rarely shrubby, with a colorless juice and alternate leaves often in pairs. *Flowers* mostly regular, often extra-axillary, 5-parted, on bractless pedicels. *Corolla* valvate or plicate in the bud, and often convolute. *Calyx* persistent. *Stamens* 5, adherent to the corolla tube, alternate with its lobes; anthers 2-celled. *Fruit* a 2-(rarely 3- or more)celled capsule or berry. *Seeds* ∞, with a curved embryo in fleshy albumen. Figs. 66, 113, 168, 260, 483–4.

§ NOLANEÆ. Ovaries few or ∞, distinct, simple. Corolla funnel-bell-form.......NOLANA. 1
§ SOLANEÆ. Ovary 1, compound, 2-(or more)celled...(*)
  * Corolla wheel-form, the tube very short. Anthers convergent...(*b*)
  * Corolla bell-form, the broad tube including the erect anthers...(*c*)
  * Corolla funnel-form, tube long and—*a* the limb somewhat unequal...(*d*)
                                   —*a* the limb quite regular...(*e*)
    b Stamens connate, opening by slits inside. Berry torous....................LYCOPERSICUM. 2
    b Stamens connivent, opening by terminal pores. Berry round..............SOLANUM. 3
    b Stamens connivent, opening by slits. Berry dryish, angular..............CAPSICUM. 4
      c Corolla bluish. Berry dry, enclosed in the enlarged calyx..............NICANDRA. 5
      c Corolla yellowish. Berry juicy, enclosed in the enlarged calyx........PHYSALIS. 6
      c Corolla purplish. Berry blackish, sitting on the open calyx.........ATROPA. 7

d Stamens exserted, declinate. Capsule opening by a lid..........HYOSCYAMUS. 8
d Stamens included, unequal. Capsule opening by valves..........PETUNIA. 9
e Stamens exserted, growing to the summit of the tube..........NEIREMBERGIA. 10
e Stamens exserted, growing to the bottom of the tube..........LYCIUM. 11
e Stamens included.—*x* Flowers 3′—12′ long. Calyx prismatic..........DATURA. 12
—*x* Flowers 1′—4′ long. Calyx terete..........NICOTIANA. 13
—*x* Flowers 6—10″ long. Calyx terete, short..........CESTRUM. 14
—*x* Flowers 5″ long. Leaves very small..........FABIANA. 15

1. **NOLÀNA,** L. Calyx 5-parted. Cor. showy, funnel-bell-form. Ovaries 3—40, distinct, 1-6-celled, becoming as many drupes around the base of the style. ♃ ♄ From S. America, with blue flowers.

1 **N.** ATRIPLICIFÒLIA. Stems procumbent; leaves thick, entire, ovate to spatulate, obtuse; flowers solitary, supra-axillary, with a yellow tube, azure-blue border, and white zone, numerous all Summer.

2 **N.** PROSTRÀTA. Leaves ovate-oblong, tapering both ways; calyx segments triangular-arrow-shaped; corolla blue with dark-purple streaks. Otherwise as No. 1.

2. **LYCOPÉRSICUM,** Tourn. TOMATO. Calyx 5–6–∞-parted. Cor. rotate, with a short tube and a plicate-valvate limb. Stamens 5–6–∞, exserted, anth. connate at apex, longitudinally dehiscent on the inner face. Berry fleshy, 2–3–∞-celled. Ped. extra-axillary, ∞-flowered.

L. ESCULÉNTUM Mill. Hairy; st. herbaceous, weak; lvs. unequally pinnatifid, segments cut; corolla many-lobed; fruit torulous, furrowed, smooth. ① A coarse, strong-scented herb with yellowish flowers and splendid fruit.

3. **SOLÀNUM,** L. POTATO. Calyx 5-parted, persistent. Cor. rotate, subcampanulate, tube very short, limb plicate, 5-cleft, lobed or angular. Anth. erect, connivent, distinct, opening at the top by 2 pores. Berry 2-celled, subglobous or depressed. Seeds ∞.—Herbs or shrubs. Peduncles terminal, becoming lateral by the extension of the axis. Figs. 260, 483–4.

§ Prickles none. Anthers obtuse...(*a*)
a Herbs, with the flowers and fruit in clusters..........Nos. 1, 2
a Shrubby climbers, with clustered flowers and fruit..........Nos. 3, 4
a Shrubs erect, with orange or scarlet berries..........Nos. 5, 6
§ Plants armed with prickles. Anthers linear-oblong, pointed...(*b*)
b Flowers 5-parted. Calyx open in fruit. Anthers equal..........Nos. 7—9
b Flowers 5-parted. Calyx closed on the fruit. Anthers unequal......Nos. 10, 11
b Flowers 6-9-parted. Calyx open with the large fruit..........Nos. 12, 1

1 **S. tuberòsum** L. *Common Potato.* Subterranean branches bearing tubers; leav pinnatifid unequally and interruptedly; corolla 5-angled, ped. jointed. S. America. Cultivated since the 17th century. Many varieties.

2 **S. nigrum** L. *Nightshade.* Smoothish; leaves ovate, toothed, wavy, or entire; umbels lateral, drooping, flowers small (2—3″), whitish; berries black, as large as a peppercorn. Weed in old fields. 2—3f. Summer. § Europe.

3 **S. Dulcamàra** L. *Bittersweet.* Stems shrubby, slender, climbing; leaves cordate, entire or with 1 or 2 pairs of lobes at base; clusters terminal and lateral, corolla purple, with 5 green spots; fruit red. July. § Europe.

4 **S.** JASMINOÌDES. Climbing high, smooth, lvs. ovate, entire; clusters blue-wh. Brazil.

5 **S.** PSEUDO-CÁPSICUM. *Jerusalem Cherry.* Erect, like a dwarf tree; leaves oblong-lanceolate, smooth, shining; flowers solitary, white, berries scarlet, as large as cherries. Mauritius. 2—4f. Handsome.

6 **S.** LACINIÀTUM. Shrub erect, smooth; lvs. pinnatifid; fls. blue; fr. orange. Australia.

7 **S. Carolinénse** L. *Horse Nettle.* Prickles large, yellow, scattered on the stem, petioles, and veins; leaves angular-lobed, acute; flowers white, 10—15″, racemed; berries yellow. Roadsides, N. Y., S. and W. 1—2f. June.

8 **S. Virginiànum** L. Hairy and prickly; leaves deeply pinnatifid with angular-sinuate lobes; flowers pale-violet, 15″, in leafy racemes. Va., and S. July.

9 **S. mammòsum** L. *Apple-of-Sodom.* Villous and with scattered spines; leaves roundish-ovate, subcordate, lobed; berries inversely pear-shaped. ① Waste grounds, Ga., Fla., and W. Flowers violet, 15″. Fruit yellow.

10 **S.** ROSTRÀTUM. Hoary-tomentous and very prickly; leaves doubly sinuate-lobed; flowers yellow, 12—15″; fruit closed in the burr-like calyx. ① Kansas.

11 **S.** HETERODÓXUM. Very hairy and prickly; leaves doubly pinnatifid, lobes runcinate; flowers violet-blue. ① From Texas. Fruit black.

12 **S.** MELÓNGENA (or esculenta). *Egg Plant.* Prickly; lvs. ovate, wavy or sinuate; flowers violet; fruit very large, glossy-purple, prized as a great delicacy. E. India.—A variety has *white* fruit exactly imitating a goose-egg.

13 **S.** TEXÀNUM. With scarlet fruit depressed-globous and lobed. From Tex. Mex.

4. **CÁPSICUM,** Tourn. PEPPER. Calyx erect, 5-cleft. Cor. rotate, tube very short, limb plaited, 5-lobed. Anth. connivent. Fr. capsular, dry, inflated, 2–3-celled. Seeds flat, very acrid.—Herbs or shrubs, with hot and acrid taste. Leaves often in pairs. Ped. axillary, solitary.

C. ÁNNUUM. *Red* or *Cayenne P.* Herb with angular, branching stem, smooth ovate entire leaves and large roundish or lance-form red fruit. ① Many varieties.

5. **NICÁNDRA,** Adans. APPLE OF PERU. Cal. 5-cleft, 5-angled, the angles compressed, sepals sagittate. Cor. campanulate. Sta. 5, incurved. Berry enveloped in the persistent calyx. ① Peruvian. Summer.

N. physaloìdes Adans. Herb smooth, with ample ovate-oblong, sinuate-angled lvs.; flowers solitary, axillary, white, with blue spots. Gardens and fields. 2—5f. §

6. **PHÝSALIS.** L. GROUND CHERRY. Calyx 5-cleft, persistent, at length inflated. Cor. bell-rotate, tube very short, limb obscurely 5-lobed. Sta. 5, connivent. Berry globous, enclosed within the 5-angled calyx.—Herbs (rarely shrubs) with angular branches. Leaves alternate or unequally twin. Flowers solitary, nodding, extra-axillary, all Summer.

§ Anthers yellow. Ped. elongated. Fruit edible, not filling the calyx...(*a*)
  a Corolla yellow with brown-purple in the centre........................Nos. 1—3
  a Corolla yellow in centre as well as border..Nos. 4, 5
§ Anthers blue or violet. Ped. shorter than the petioles...(*b*)
  b Peduncles near 1′ long. Berry not filling the closed calyx.............Nos. 6—8
  b Peduncles 2—3″ long. Berry filling the open calyx... ....No. 9

1 **P. viscòsa** L. Viscid-pubescent, diffuse; leaves ovate to oblong, mostly abrupt at base and bluntly toothed; corolla 8—10″; fruiting-calyx 1½′. ♃ Dry soils. 1f.

2 **P. Pennsylvánica** L. Puberulent, decumbent; leaves ovate to lanceolate, repand-toothed or entire, base obtuse or acute; corolla slightly spotted, 6—8″; fruit-calyx rounded, 1′. ♃ Dry soils, Penn., S. and W. 6—15′.

β. ***lanceolàta.*** Pubescent; leaves tapering and acute both ways. S.

3 **P. angustifòlia** N. Glabrous; leaves lance-linear, entire, thickish; fruit-calyx wing-angled, 1′; corolla 10—12″. ♃ Wet sands, Fla. 6—12′.

4 **P. nyctagínea** Dun. Pubescent; leaves small, elliptic-ovate, blunt-toothed; calyx hairy; corolla small (5—6″), wholly yellow. South. 6—12′.

5 **P. Alkekéngi** L. *Strawberry Tomato.* Pubescent, erect; leaves deltoid-ovate, acuminate, repand; calyx reddening in fruit, ♃ Gardens and fields. 1—2f.

6 **P. pubéscens** L. Viscid-tomentous, decumbent; leaves ovate or cordate, base unequal, repand; corolla spotted, 6″; fruit-calyx 5-angled. ① Damp. S. and W. 9—18′.

7 **P. angulàta** L. Smooth, erect; lvs. ovate to oblong, acutely toothed; cor. small (3—6″); fruit-calyx ovoid-conic, longer than its stalk. ① Dry fields.

8 **P. Linkiàna** Nees. Smooth, diffuse, 2f or more; leaves lance-oblong, *attenuate* both ways, *subulate*-toothed; corolla 6″; fruit-calyx 1¼′. ① S. C., Ga. (Dr. Feay).

9 **P. Philadélphica** Lam. Smoothish, erect; lvs. obliquely ovate, pointed, angular-repand; corolla 9″, spotted and striped; berry large, red. ① M. and W. †

7. **ÁTROPA,** L. DEADLY NIGHTSHADE. Calyx 5-parted. Cor. campanulate, limb 5-cleft, valvate-plicate in bud. Stam. 5, distant, included. Berry globous, 2-celled, sitting on the enlarged calyx. ♃ Herbs of lurid colors. Leaves often twin.

A. BELLADÓNNA.—Europe. Leaves ovate, entire, large. Berries dark-purple, handsome but poisonous, like the whole plant. Medicinal.

8. **HYOSCỲAMUS,** Tourn. HENBANE. Calyx tubular, 5-cleft. Cor. funnel-form, one of the 5 obtuse lobes larger. Sta. 5, declinate. Stigma capitate. Capsule ovoid, 2-celled, opening with a lid near the summit.—Coarse herbs, native in Eastern countries.

H. niger L. Branched, very leafy, viscid-hairy and fœtid; leaves sinuate-lobed, clasping; corolla straw-color, netted with purple, in one-sided spikes. ② In old fields, and rubbish. 2f. Poisonous—medicinal. July.

9. **PETÙNIA,** Juss. Cal. segments oblong-spatulate. Cor. funnel- or salver-form, tube cylindric, limb spreading, slightly unequal. Sta. 5, inserted in the middle of the tube, unequal, included. Caps. 2-celled. Seeds minute. South American herbs. Leaves alternate, entire, the floral twin. Flowers solitary, large, all Summer. Fig. 66.

1 **P.** NYCTAGINIFLÒRA. Erect, diffusely branched, viscid-hairy; flowers white, tube slender, thrice longer than the calyx, limb spreading 1½—3′. ♃

2 **P.** VIOLÀCEA. Prostrate at base, then erect, viscid-hairy; flowers violet-purple, tube inflated, twice longer than the calyx. By admixture numerous varieties, single, double, striped, &c., are raised.

10. **NIEREMBÉRGIA,** Ruiz & Pav. Cal. curved, 5-cleft. Cor. funnel-form, tube long and slender, limb ample, spreading, plicate, slightly unequal. Sta. 5, inserted in the throat, unequal, connivent, anth. hid beneath the stigma. Capsule 2-celled, ∞-seeded.—South American, chiefly herbs, creeping, with elegant, solitary, extra-axillary flowers.

N. GRÁCILIS. Stems very slender and much branched; lvs. linear to spatulate; flowers 1′ or more, white, lilac, purple, with a yellow eye.

11. **LÝCIUM,** L. MATRIMONY VINE. Cal. 2–5-cleft. Cor. tubular, bell- or funnel-form, 4- or 5-lobed. Sta. 4 or 5, exserted. Berry 2-celled, seeds several. ♄ ♄ Often spiny. Leaves alternate, entire, often clustered. Flowers small, solitary or in pairs.

L. Bárbarum L. Branches spiny, slender, pendulous or climbing; leaves lanceolate; corolla greenish-purple, 5-parted; calyx 3- or 4-toothed; berries small, orange-red. From Barbary. Planted for arbors, walls, &c.

2 **L. Caroliniànum** Mx. Branches rigid, spiny, upright; lvs. fleshy, club-shaped, clustered; flowers small, 4-parted, purple. Salt marshes, S. 3f.

12. DATÙRA, L. THORN APPLE. Calyx large, tubular, inflated, deciduous, or spathe-form. Cor. funnel-form, limb plicate in bud, with 5 or 10 cuspidate angles. Sta. 5. Caps. 2-celled, 4-valved, cells 2-parted. ①♄ Coarse, fœtid, poisonous, with large, often handsome flowers. Fig. 168.

§ Calyx deciduous, its base persistent. Flowers suberect. ①...(*a*)
a Limb of the corolla 5-toothed. Pods erect..............................Nos. 1—3
a Limb of the corolla 10-toothed. Pods drooping..........................Nos. 4, 5
§ Calyx persistent, splitting and spathaceous. Flowers erect. ①..............No. 6
§ Calyx persistent, often splitting. Flowers pendulous. Tree-like ....Nos. 7—9

1 **D. Stramònium** L. *Jimson Weed.* Stem forked; lvs. large, ovate, with unequal sides and angular teeth; corolla cream-white, 2′ long. Waste grounds. 3f. §

β. ***Tàtula.*** Stem purple; flowers bluish-white; stem 3—4f. S. and W. §

2 **D.** QUERCIFÒLIA. Leaves sinuate-pinnatifid; flowers white, 5′ broad. Mexico. 2f.

3 **D.** FASTUÒSA. Stem dark purple, with whitish, shining dots; lvs. lance-ovate; cor. violet without, white within, single or double, 7′ long. ① Egypt. Splendid.

4 **D.** METEL. Villous-pubescent; lvs. ovate; flowers white, 4′ broad. Mexico. 3—4f.

5 **D.** METELOÌDES. Smoothish, slender; leaves ovate-oblong; flowers pure white or tinged with blue, 5′ broad. Very fine. From Mexico.

6 **D.** CERATOCAÙLA. Stem terete, thick, purple; leaves lance-ovate; corolla thrice longer (5—7′) than the calyx, tube incurved, limb 10-toothed. Cuba.

7 **D.** ARBÒREA. Leaves lance-ovate, downy; calyx spathaceous, entire; corolla 8—10′ long, white, green-veined; anthers distinct. Peru. Flowers often double.

8 **D.** SUAVÈOLENS. Leaves ovate-oblong, entire; calyx 5-toothed; corolla 9—12′ long, sweet-scented, white; anthers cohering. Mexico.

9 **D.** SANGUÍNEA, has flowers 8′ long, limb red, tube yellow, with purple veins. Peru.

13. NICOTIÀNA, Tourn. TOBACCO. Calyx urn-shaped, 5-toothed. Cor. funnel-form, 5-lobed. Sta. 5. Caps. 2-celled, 2–4-valved. ① Coarse narcotics, with large, entire leaves and terminal fls. Jn.—Aug. Fig. 113.

1 **N. rùstica** L. Viscid-pubescent; lvs. petiolate, ovate; corolla tube cylindric, lobes round-obtuse, greenish-yellow. Weed in N. Y., &c. 1—1½f. §

2 **N.** TABÀCUM. *Virginia T.* Viscid-pubescent; leaves lanceolate, sessile and decurrent; corolla tube inflated in throat, lobes acute, rose-color. 4—6f.

3 **N.** LONGIFLÒRA. Branches spreading; upper leaves sessile, cordate-lanceolate; flowers racemed, white-purple-yellow, tube slender, 4′. Hardy South.

14. CESTRUM, L. Calyx often colored, 5-cleft. Cor. tubular-funnel-form, tube clavate, limb 5-cleft or 5-parted, plicate in bud. Sta. 5, included, adnate to cor. below. Style 1. Berry few-seeded. ♄ S. American, with entire leaves and brilliant flowers in clusters, fragrant.

§ HABROTHÁMNUS. Corolla clavate, red or purple, limb suberect...........Nos. 1, 2
§ EUCÉSTRUM. Corolla club-funnel-form, yellow-orange, limb spreading....Nos. 3, 4

1 **C.** ÉLEGANS. Lvs. lance-ovate; corolla purple, shining, 9″; calyx purple, 3″. 5—6f.

2 **C.** FASCICULÀTUM. Lvs. broad-ovate; corolla scarlet, 9″; calyx reddened, 3″. 5—6f.

3 **C.** AURANTÌACUM. Leaves lance-ovate; corolla tube inflated, orange-colored, 5″. 4f.

4 **C.** PARQUI. Leaves narrow-lanceolate; corolla dull yellow, 6″, tube terete.

15. FABIÁNA IMBRICÀTA, Ruiz & Pav., is a fine little shrub resembling a Tamarix, with small (6″ long) ovate leaves covering the numerous branches, and small violet-white flowers. † Chili.

ORDER XCVII. GENTIANACEÆ. GENTIANWORTS.

Herbs smooth, with a colorless, bitter juice, with entire, exstipulate leaves. *Flowers* regular, mostly centrifugal in inflorescence and convolute in the bud. *Calyx* persistent. *Corolla* withering, its lobes alternate with the stamens. *Ovary* free, 1-celled, with 2 more or less projecting parietal placentæ. *Fruit* a 2-valved, septicidal, ∞-seeded capsule, rarely baccate. *Seeds* with a minute, straight embryo in the axis of fleshy albumen. Fig. 140.

I. GENTIANEÆ. Corolla convolute (in No. 8 imbricate) in the bud. Leaves opposite...(*b*)
II. MENYANTHEÆ. Corolla valvate-induplicate in the bud. Leaves alternate or radical...(*a*)
 a Petals beardless or nearly so. Leaves simple, floating..........LIMNANTHEMUM. 10
 a Petals bearded inside. Leaves trifoliate, erect..........MENYANTHES. 9
 b Sepals only 2. Corolla 4-parted, tubular-campanulate..........OBOLARIA. 8
 b Sepals as many as the petals, more or less united...(*c*)
  c Corolla lobes furnished each with a spur in the middle of the back..........HALENIA. 7
  c Corolla lobes furnished each with a large central gland..........FRASERA. 6
  c Corolla lobes plain, without spurs or glands...(*d*)
   d Leaves reduced to scales. Corolla deeply 4-parted..........BARTONIA. 5
   d Leafy.—*e* Style none, stig. sessile. Corolla tubular..........GENTIANA. 4
    —*e* Style present.—*x* Corolla tube longer than the limb..........ERYTHRÆA. 3
     —*x* Corolla tube shorter than the limb..........EUSTOMA. 2
     —*x* Corolla wheel-form, tube none..........SABBATIA. 1

1. SABBÀTIA, Adams. AMERICAN CENTAURY. Calyx 5–12-parted. Cor. rotate, 5–12-parted. Sta. 5—12, anth. soon recurved. Style 2-parted. Caps. 1-celled. ① ② Slender, with very beautiful flowers, in Summer.

§ LAPITHÆA. Corolla 7–12-(mostly 9-)parted, rose-red..........Nos. 1, 2
§ SABBÀTIA *proper*. Corolla 5-(rarely 6-)parted...(*a*)
 a Flowers white, paniculate or scattered..........Nos. 3, 4
 a Flowers white, in a level-topped cyme. Branches opposite..........Nos. 5, 6
 a Flowers rose-red.—*b* Branches opposite..........Nos, 7, 8
  —*b* Branches alternate..........Nos. 9, 10

1 **S. chloroìdes** Ph. Simple or forked; flowers 1—5, *pedunculate*, 20″; petals oblanceolate, 10″; sepals linear-spatulate, 6″; leaves lanceolate to oblong. Wet grounds, Plymouth, Mass., R. I., and S. 1—2f. †

2 **S. gentianoìdes** Ell. Strict, subsimple; leaves linear, exceeding the internodes; flowers *sessile*, 2-bracted, solitary, or several together; petals obovate, 10″; sepals lance-subulate, 4″. Wet barrens, Ga., Fla., and W. 1—2f.

 β. ***Boykinii*** (Gray). Leaves lance-oblong, at least the lower. Ga.

3 **S. calycòsa** Ph. Rigid, divaricately-forked; flowers few, distant; sepals oblanceolate (5—8″), as long as the petals; leaves oblong, 3-veined. Va., and S. 1f.

4 **S. paniculàta** Ph. Stem much branched, terete, with 4 thread-like ridges; branches mostly opposite; leaves small, oval, oblong to linear; panicle diffuse; sepals subulate, 3″; petals 6″. Low grounds, Va., and S. 1—2f.

 β. ***Elliòttii.*** Branches alternate; leaves mostly linear; petals 7 or 8″.

5 **S. lanceolàta** (Walt.) Corymbously-branched and 4-angled above; leaves ovate to lanceolate, 3-5-veined; flowers 6-parted, 1′ broad. Barrens, N. J. to Fla. 2f.

6 **S. macrophýlla** Hook. Stem terete throughout, corymbed at top; leaves erect, thick, ovate, acuminate, 3-5-veined; flowers small (½′ broad). Fla., La.

7 **S. angulàris** Ph. Stem with 4 winged angles, corymbous-panicled; leaves ovate, 5-veined, clasping; flowers 15—18″ broad, with a greenish star. Wet meadows, N. Y. to Ill., and S. 10—18′.

8 **S. brachiàta** Ell. Stem obtusely 4-angled, panicled; leaves lance-linear to linear,

lowest ovate; flowers 15″, the star purple, bordered with green; petals oblong-obovate, obtuse. Prairies, Ind. to Va., and S. 1f.

9 **S. grácilis** Salisb. Very slender, diffuse; leaves oblong to linear-filiform: flowers distant; pet. elliptic, obtuse, 5″; sep. filiform, 4″. Wet, Mass. to Fla., and La. 2f.

β. ***stellàris.*** Suberect, the flowers larger (13″ broad), the star yellow.

10 **S.** Campéstris. Low (6—10′), erect; lvs. ovate to oblong; fls. few, 15″ broad, the star yellow; calyx tube 5-winged; sepals as long as the broad petals. La.

2. **EÙSTOMA,** Don. Calyx 5- or 6-parted, with subulate segments. Cor. wheel-funnel-form, 5–6-parted. Sta. shorter than the style.—Herbs glaucous, with few large splendid blue flowers.

1 **E.** Russelliànum. Stem 1—2f, forked; lvs. ovate, cuspidate, subconnate; fls. long-stalked, expanding 3—4′, petals oval. ① Ark. (Mr. Robertson).

2 **E. exaltàtum,** taller, with flowers 2′ broad, grows in S. Fla. (Chapman).

3. **ERYTHRÆ̀A,** Renealm. Calyx 5–4-parted, angular. Cor. funnel-form, 5–4-parted, tube slender. Anth. 5–4, exserted, spirally twisted. Style slender. ① Stem squarish, 3—10′. Leaves connate at base.

1 **E. ramosíssima,** β. ***Muhlenbérgii*** (Griseb.) Stem 1-3-times-forked into a loose cyme; leaves ovate-oblong; flowers *pedicellate*, bright purple, 4″. L. Is. to Va.: rare.

2 **E. spicàta** Pers. Stem forking, erect; leaves oval to lanceolate; fls. sessile, 8″, spicate on the long branches, rose-white. Nantucket to Md. § Europe.

3 **E. Centaùrium** Pers. Erect; lvs. oblong, acutish at each end; flowers subsessile in the loosely corymbed cymes, rose-purple, 6″. Oswego, N. Y. August. §

4. **GENTIÀNA,** Tourn. Gentian. Calyx 5- or 4-parted or entire. Cor. tubular, limb 5- or 4-cleft, closed or open. Sta. 5 or 4. Stig. 2, style 0 or very short. Capsule oblong, 1-celled, seeds numerous and minute.—Herbs with showy flowers in August to October.

§ Fls. 4-parted, fringed, sky-blue; no crown or folds. ①....................Nos. 1, 2
§ Fls. 5-parted, blue, pedicellate, clustered; no fringe or folds. ①..............No. 3
§ Fls. 5-parted, corolla with folded appendages between the lobes. ♃...(*a*)
a Flower solitary, terminal, somewhat stalked. Leaves linear..............No. 4
a Flowers clustered, sessile,—*b* ochroleucous or whitish................Nos. 5, 6
—*b* blue; the corolla always closed............No. 7
—*b* blue; the corolla open or expanding...Nos. 8—10

1 **G. crinìta** Frœl. *Fringed G.* Stem and branches erect; leaves lanceolate, acute; petals obovate, finely fringed at margin. ① Moist soils, Can. to Ga., and W. 1f. A beautiful and interesting plant.

2 **G. detónsa** L. Stem and few branches strict; leaves lance-linear; flowers solitary, long-stalked, petals crenate-ciliate. ① N. Y. to Wis. 1f.

3 **G. quinqueflòra** L. St. 4-angled; lvs. ovate to lanceolate, acute; fls. 7—8″, pedicellate, clustered; sepals subulate, very short, or (in β. ***parviflòra***) lance-linear, 4″; corolla segments bristle-pointed. ② Fields and woods. 1f.

4 **G. angustifòlia** Mx. Slender, erect; fl. 18—20″ long; lvs. linear; sepals linear, 7—10″; corolla blue, lobes ovate, the cleft folds much shorter. N. J. to Fla. 1f.

β. ***viridiflòra.*** Flower nearly sessile, 15″, greenish white, folds very short. S.

5 **G. ochroleùca** Frœl. Lvs. smoothish, oval to elliptical, acutish both ends; calyx segments lance-linear, nearly equalling the 20″ corolla. Pa. (Prof. Porter) to Fla. 1f.

6 **G. alba** Muhl. Very smooth, stout; lvs. lanceolate, the broad base clasping; fls. 2′ long, calyx segments ovate, very short. Woods, prairies, M. and W. 1½—2f.

7 **G. Andrèwsii** Griseb. *Closed Blue G.* Simple, smooth; leaves oval-lanceolate;

cluster dense, terminal; calyx segments ovate-oblong, 3—4″; corolla 18″, inflated, *never opening*, folds as long as segments. Woods, N. Eng. to Fla. ♃.

8 **G. Saponària** L. Subsimple, stout, smooth; leaves oblanceolate to lance-oblong, 3-veined; calyx segments linear, 6—8″; corolla 2′, folds much shorter than the open erect lobes. N. J., Pa., to Ill., and S. ♃. Leaves 2—3′.

9 **G. lineàris** Wood. Simple, slender; lvs. lance-linear to linear, 1-(rarely 3-)veined; calyx segments subulate, 4—7″; corolla folds subentire, much shorter than the erect or spreading lobes. N. Eng. (rare) to Iowa and Ky. 1—1½f. July—Sept.

10 **G. pubérula** Mx. Slender, rough or puberulent; leaves 1′, oval to ovate, very rough-edged, clasping, acute; calyx segm. lanceolate, 5″; corolla subcampanulate, 15″, lobes very acute, folds short, cleft. Prairies, W. and S. 9—18′.

5. **BARTÒNIA,** Muhl. Screw-stem. Fls. 4-parted, persistent. Cor. subcampanulate, pet. slightly united. Stig. thick, some bifid. Sds. very ∞ and minute. ♃ Slender, erect, with scale-like lvs. and small white fls.

1 **B. verna** Muhl. Low, simple, 3—5′, clustered; ped. 1-flowered, petals 3″, oblong, obtuse, sepals 1″, acute. Bogs and barrens, Va. to Fla. March.

2 **B. tenélla** Muhl. Branched above, very slender, 5—12′; ped. opposite, erect, subequal, 4″; petals pointed, 1″, sepals nearly as long. Wet. Mass. to Fla. August.

β. ***brachiàta.*** Pedicels bent outward and upward, some alternate. S.

6. **FRÀSERA,** Walt. Columbo. Fls. mostly 4-parted. Pet. united at base, oval, spreading, each with 1 or 2 bearded glands in the middle. Sty. 1, stig. 2, distinct. Caps. compressed, 1-celled. Seeds few, large, elliptic, margined. ♃ Showy and tall, with opposite or verticillate leaves.

F. Carolinénsis Walt. Smooth, 4—9f high! paniculate above; lvs. oblong, sessile, in 4's—6's; petals greenish with blue dots, and a large purple gland. Rich soils, N. Y., S. and W. A stately plant, and a good tonic. June, July.

7. **HALÈNIA,** Borkh. Felwort. Flowers 4-parted, broad bell-form. Each petal prolonged at base into a spur, which is glandular at the end. Stigmas 2, sessile.—Flowers panicled.

H. defléxa Griseb. Erect, branched, lower leaves oblanceolate, upper lance-ovate, 3-5-veined; spurs slender, curved outward, half as long as the 4″ greenish-yellow petals. ② N. Eng. (rare) to Wis. 18′. August.

8. **OBOLÀRIA,** L. Pennywort. Calyx of 2 wedge-oblong sepals. Corolla tube-bell-form, 4-cleft. Sta. on the corolla. Stigma sessile, bifid. Seeds ∞, very minute. ♃ Flowers sessile, pale.

O Virgínica L.—Woods, N. J., W. and S. Stem 4—8′, subsimple. Leaves roundish, sessile, thick, crowded above, sepals similar. April, May.

9. **MENYÁNTHES,** Tourn. Buck Bean. Cal. 5-parted. Cor. rotate or funnel-form, limb spreading, 5-lobed, villous within, no glands at the base. Stamens 5. Style 1, stigma bifid. Capsule 1-celled.—Bitter herbs, actively medicinal. Leaves trifoliate, nearly radical.

M. trifoliàta L.—In muddy places, Penn. to Cal., and N. 8—12′. Petioles long and round. Scapes bearing racemes of handsome, flesh-colored flowers. May.

10. **LIMNÁNTHEMUM,** Gmel. Floating Heart. Cal. 5-parted. Cor. rotate, each seg. with a glandular scale at base. Sty. short or 0, stig.

2-lobed. Caps. opening by decay. ♒ Stagnant water. Pet. long, bearing an umbel of small white fls. below the roundish leaf-blade, also oblong tubers.

1 **L. lacunòsum** Griseb. Leaves small (1—2′), smooth, round-reniform; seeds smooth and shining. N. Eng. to Fla. (Villarsia lacunosa Vent.)

2 **L. trachyspérmum** Gray. Lvs. large (3—5′), dotted and pitted beneath; seeds muricate about the margins. Md. to Fla. and La. (Menyanthes, Mx.)

ORDER XCVIII. LOGANIACEÆ.

Herbs or *shrubs* with opposite leaves, stipules between the petioles or at least a ridge, and with 4- or 5-parted regular gamopetalous flowers. *Ovary* superior, *stigmas* as many as the cells. *Fruit* a 2-celled capsule, or a 1–2-seeded drupe. *Seeds* winged or peltate, with albumen. Fig. 47.

* Delicate, twining shrubs, with large yellow flowers. S. ....GELSEMIUM. 1
* Low herbs.—*x* Flowers scarlet, tubular, with one style..................................SPIGELIA. 2
—*x* Flowers small, white, 5-parted, in 1-sided racemes......................MITREOLA. 3
—*x* Flowers small, white, 4-parted, in axillary cymes.................................POLYPREMUM. 4

1. GELSÈMIUM, Juss. YELLOW JESSAMINE. Cor. bell-funnel-form with 5 short rounded lobes. Sta. 5, now longer and now shorter than the style (*dimorphous*). Caps. flattened, twin, cells each with 4—6 winged sds. ♄ Very slender, with numerous flowers. The stipules a mere ridge.

G. sempérvirens Ait.—Woods and banks, Va., and S., overrunning bushes and low trees. Leaves thick, shining, lanceolate. Flowers 1′. March—May.

2. SPIGÈLIA, L. PINK-ROOT. Calyx seg. linear-subulate. Cor. narrowly funnel-form, limb 5-cleft. Anth. 5, convergent. Caps. twin-lobed, few-seeded.—Herbs, with the flowers sessile in terminal spikes. Fig. 47.

S. Marilándica L. Stem square, erect, simple; leaves sessile, ovate-lanceolate; spike scorpoid, uncoiling as the 3—8 handsome flowers expand; corolla 1½—2′ long. ♃ Thickets, Pa. to Ill., and S. June. Medicinal.

3. MITRÉOLA, L. Corolla tubular, short, 5-cleft, hairy in the throat. Sta. 5, included. Ovary 2-celled, styles 2, united only at top with 1 stigma. Capsule 2-horned, ∞-seeded. ① Flowers in several scorpoid spikes at top of a long terminal peduncle. June—August.

1 **M. petiolàta** T. & G. Branching; leaves ovate to lanceolate, tapering at base to a petiole; raceme loose-flowered. Va., and S. 1—2f.

2 **M. sessilifòlia** T. & G. Nearly simple; leaves oval to elliptical, sessile, shorter than the internodes; raceme close-flowered. S. C. to Fla. 10—18′.

4. POLYPRÈMUM, L. Calyx seg. 4, subulate. Corolla broad bell-form, lobes a little unequal, obtuse, throat bearded. Stamens 4, included. Stigma subsessile. Capsule ovoid. ① Smooth, diffusely branched from base, with linear-subulate leaves. Flowers sessile.

P. procúmbens L.—Dry fields, Va., and S. 6—12′. In dense patches. May—Sept.

ORDER XCIX. APOCYNACEÆ. DOG-BANES.

Plant with an acrid, milky juice, entire, exstipulate, mostly opposite lvs.

Flowers 5-parted, regular, the calyx persistent, the corolla twisted in æstivation. *Stamens* 5, with distinct filaments, anthers filled with granular pollen. *Ovaries* 2, distinct, but their stigmas blended into a head-shaped mass. *Fruit* 1—2 follicles, or capsular or baccate, with albuminous seeds.

§ Herbs erect, native.—*a* Corolla bell-form, whitish. Leaves opposite..................APOCYNUM. 1
—*a* Corolla salver-form, blue. Leaves alternate..................AMSONIA. 2
§ Half-shrubby, cultivated, trailing or erect. Corolla wide-spread....................VINCA. 3
§ Shrubs twining.—*b* Native. Flowers small, yellowish..............................FORSTERONIA. 4
—*b* Cultivated. Flowers large, white..............................ECHITES. 5
§ Shrubs erect.—*c* Leaves opposite or in 4's. Corolla yellow..........................ALLAMANDA. 6
—*c* Leaves opposite or in 3's. Corolla roseate.......................NERIUM. 7
—*c* Leaves alternate. Flowers 3″. Fruit a drupe. S. Fla.............VALLESIA.

1. APÓCYNUM, Tourn. DOG'S-BANE. Cor. bell-form with short lobes. Sta. included, alternating with 5 glandular teeth on the base of the corolla. Ovaries 2. Stigma connate. Follicles slender, distinct. Seeds comous. ♃ Leaves entire, mucronate, opposite. Flowers pale, in cymes, June—Aug.

1 **A. androsæmifòlium** L. Leaves ovate; cymes terminal and lateral; cor. 3″, with red stripes, tube longer than the calyx, lobes spreading. Hedges and fields. 3f. A handsome plant, smooth or downy.

2 **A. cannabìnum** L. Leaves oval to lance-oblong, often downy beneath; cymes terminal; corolla 1″, tube not longer than the calyx, lobes erect. In shades. 2—4f. Pods 3′ long. (A. hypericifolium Ait.)

2. AMSÒNIA, Walt. Calyx segment pointed. Cor. tube hispid, funnel-form, limb in 5 linear segments twisted in bud. Style 1. Ovaries 2, connate at base, follicles 2, erect, slender. Seeds not comous. ♃ Leaves alternate, entire. Clusters terminal, blue.

1 **A. Tabernæmontàna** Walt. Leaves ovate-lanceolate, acuminate; sepals lance-acuminate; corolla 8″, livid blue. Damp grounds, W. and S. 2f. May, June.—Varies with leaves lance-elliptic, and sepals acute.

2 **A. ciliàta** Walt. Leaves more or less crowded, linear or filiform, the margins ciliate; cluster long-stalked, corymbed, or soon panicled; corolla glabrous outside. Sands, S.: common. 1—2f. April, May.

3. FORSTERÒNIA, Meyer. Corolla funnel-form, deeply 5-cleft, twisted in bud. Anthers adherent to the stigma. Stigma 2-lobed. Follicles 2, spreading, seeds comous. ♄ Leaves opposite.

F. difformis DC. Climbing; leaves round-oval to lance-oval, cuspidate-pointed; cymes axillary and terminal, stalked; calyx segments ovate, long-pointed; corolla 3—4″, pale yellow. Swamps, Va., and S. May—August.

4. VINCA, L. PERIWINKLE. Cor. funnel- or salver-form, convolute, with the 5 lobes oblique, orifice 5-angled. Two glands at base of the ovary. Follicles 2, erect, slender. ↳ ƅ Lvs. opposite. Flowers solitary, axillary.

1 **V.** MINOR. Procumbent; leaves elliptic-lanceolate, not ciliate; sepals lanceolate; flowers scentless, violet, purple, or white. May, June. Europe.

2 **V.** MAJOR. Decumbent; leaves ovate, ciliate at edges; sepals long, bristle-pointed. In shades, forming loose masses, leaves often silver-edged. Europe.

3 **V.** ROSEA. Erect, soft-downy; leaves oval, obtuse; flowers large, roseate, often white or white-edged, perpetual. From Madagascar.

5. ECHÌTES, Br. Cor. funnel- or salver-form, not appendaged, lobes convolute, bearing the subsessile anthers in the throat; 5 glands at base of ovaries. Foll. 2, slender. Sds. comous. ♄ ♄ Lvs. opp. (Mandevilla, Lindl.)

E. SUAVÈOLENS. Climbing; leaves cordate-ovate, acuminate, shorter than the axillary or terminal racemes; flowers fragrant, 2′. S. America.

E. umbellàta Jacq. and **E. Andréwsii** Chapm. are indigenous in S. Fla.

6. ALLAMÁNDA CATHÁRTICA. Shrub from Guyana, with slender branches, oblong thin-pointed leaves, and bright-yellow flowers 2½—3′. Cor. funnel-bell-form, lobes 5, rounded, throat appendaged. Ova. 1, becoming a prickly, 1-celled capsule.

7. NÈRIUM, L. OLEANDER. Corolla salver-form, convolute, throat crowned with 5 cleft scales. Anth. arrow-shaped, tipped with a long hairy bristle. ♄ Lvs. lanceolate, acute both ways, thick and leathery, in 2's or 3's.

1 **N.** OLEÁNDER. Leaves lanceolate; scales of the crown each of 3 or 4 pointed unequl teeth; fls. clustered, inodorous, often double, 2′. Palestine. 5—10f, very handsome.

2 **N.** ODÒRUM. Leaves linear-lanceolate; scales of the crown each 4-7-cleft; appendages of the anthers exserted; flowers fragrant. India.

ORDER C. ASCLEPIADACEÆ. ASCLEPIADS.

Plants (chiefly herbs in the United States) with a milky juice, often twining. *Leaves* opposite (rarely whorled or scattered), without stipules, entire. *Flowers* generally umbellate, 5-parted, regular, the *sepals* and also the *petals* united at base, both valvate in æstivation. *Stamens* united, adherent to and covering the fleshy mass of the two united stigmas. *Pollen* cohering in masses. *Ovaries* 2, forming follicles in fruit.

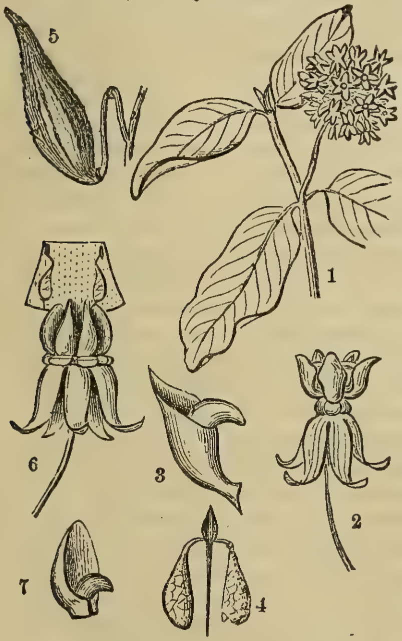


FIG. 530.—1. Asclepias cornuti. 2. A flower, the petals and sepals reflexed, and the corona erect. 3. One of the segments of the corona with the horn bent inwardly. 4. A pair of pollen masses suspended from the glands. 5. A mature follicle. 6. Vertical section of P. phytolaccoides showing the two ovaries. 7. Lobe and horn of the corona.

§ Stems erect, leafy, herbaceous...(*a*)
§ Stems climbing, often shrubby...(*c*)
§ Stems low, leaves fleshy, all radical...STAPELIA. 12
a A little horn in each *hood* of the crown. Petals reflexed..........ASCLEPIAS. 1
a No horns in the crown.—*b* Petals reflexed or spreading..........ACERATES. 2
—*b* Petals erect..........PODOSTIGMA. 3
c Corolla salver-form, white, the crown in the bottom of the tube..........STEPHANOTIS. 10
c Corolla wheel-form, flattish, the lobes spreading...(*n*)
c Corolla segments erect, crown 5-leaved,—*d* each leaflet 2-awned..........ENSLENIA. 4
—*d* leaflets awnless..........METASTELMA. 5

n Crown double, the outer a ring, the inner 5-leaved. S. Fla..................SARCOSTEMMA.
n Crown simple,—*x* deeply 5-parted. Leaves linear.......................... ...SEUTERA. ;
—*x* of 5 awned scales. Leaves ovate.............. ....PERIPLOCA. 9
—*x* a ring 5–10-lobed, or merely wavy...(*y*)
y Anther slits vertical, pollinia pendulous. Leaves thin .......................VINCETOXICUM. 7
y Anther slits horizontal, pollinia spreading. Leaves cordate................. ...GONOLOBUS. 8
y Anther slits vertical, pollinia erect. Leaves thick..........................HOYA. 11

1. ASCLÈPIAS, L. MILK-WEED. SILK-WEED. Calyx and cor. segm. soon reflexed. Staminal crown of 5 distinct *hoods* (cucullate leaflets), each with a little curved horn from within. Anth. consolidated with the stig., forming a 5-angled truncate mass (antheridium), opening by 5 chinks. Pollen masses (pollinia) 5 pairs, hanging vertically by a pedicel from a cleft gland. Follicles 2, lance-shaped, seeds comous. ♃ Erect, with the flowers in simple umbels which are between the petioles or terminal. Jn.—Aug.

* Flowers whitish, greenish, or purple in various shades...(*a*)
* Flowers orange-colored or scarlet. Leaves narrowly lanceolate.........Nos. 15—17
a Leaves ovate to lanceolate, narrowed to a petiole...(*b*)
a Leaves ovate-oblong to cordate, sessile or clasping..................Nos. 12—14
a Leaves linear, very narrow...(*x*)
b Both crown and corolla greenish-purple. Pods woolly-spiny..............Nos. 1, 2
b Both crown and corolla pure purple. Pods smooth.......................Nos. 3, 4
b Crown white; corolla white tinged with pink. Flowers small.............Nos. 5—7
b Crown white; corolla greenish-white.—*c* Umbels pedunculate............Nos. 8, 9
—*c* Umbels subsessile. S.........Nos. 10, 11
x Leaves all opposite, or rarely the highest alternate..................Nos. 18, 19
x Leaves mostly verticillate or scattered. Flowers greenish..........Nos. 20, 21

1 **A. cornùti** Dcsn. Leaves oblong-ovate, downy beneath, acutish at base and short-stalked, longer than the many-flowered umbels; hoods ovate; horns acute. Roadsides and hedges. 2—4f. Leaves 5—8′. Flowers 6″.

2 **A. Sullivántii** Eng. Leaves ovate-oblong, smooth both sides, nearly sessile; hoods obovate; horns blunt; flowers 9″. Ohio to Ill. July.

3 **A. purpuráscens** L. Simple; leaves ovate to *elliptical*, acute mucronate; umbels subsolitary, terminal; peduncle 1—2′; pedicels 1′; horns horizontal. N. Eng. to N. Car., and W. 3—4f. Flowers large (6″), dark purple. Hoods lance-ovate.

4 **A. incarnàta** L. Branching above; leaves lanceolate; umbels many or few, somewhat panicled; flowers small (3″); ped. ½—2′. Wet places. 3—5f: common.

β. ***pulchra.*** Hairy; leaves lance-oblong or -ovate. Very handsome. †

5 **A. ovalifòlia** Dcsn. Low, downy; lvs. ovate, acutish; umbels subsessile, 10–15-flwd.; pet. oval; hoods yellowish, obtuse, longer than the horns. W. (A. Vaseyi C-B.)

6 **A. perénnis** Walt. Branched at base, half-shrubby, smooth; leaves thin, lanceolate, pointed both ways, long-stalked, exceeding the small white umbels; hoods shorter than the horns. Low grounds, W. and S. 2f. (A. parviflora C-B.)

7 **A. quadrifòlia** Ph. Simple, smooth; leaves ovate, acuminate, some of them in whorls of 4; umbels few, loose-flowered, long-stalked. Dry woods. 2f.

8 **A. variegàta** L. Simple, smoothish; leaves oval to lance-oval, short-pointed, acute at base; umbels densely ∞-flowered, small (1′—18″ diam.); hoods orbicular.

β. ***nivea.*** Lvs. elliptical, pointed both ways; umb. 10–15-flwd. N. J., W. & S. 1—3f.

9 **A. phytolaccoìdes** Ph. Tall, simple; leaves broadly ovate, pointed both ways, glaucous; umbels lateral, with about 20 drooping fls.; peduncles and pedicels 1—3′ long; hoods truncate, with 4 unequal teeth; horns exserted. Damp shades. 4—5f.

10 **A. tomentòsa** Ell. Woolly, stout; leaves lance-oblong, wavy, cuspidate; umbels lateral, with many large flowers; hoods obovate, truncate. Barrens, S.

11 **A. obovàta** Ell. Tomentous; leaves obovate, obtuse, mucronate; umbels 10–14-flowered, lateral; fls. large, yellowish-green; hoods elongated. Gravels, Ga., Fla.

12 **A. rubra** L. Simple, glabrous; lvs. ovate, long and acutely pointed, subsessile; umbels panicled above, few; flowers red-purple; hoods acute, some longer than the slender exserted horns. Barrens, N. J., and S. 2—3f. Leaves 3—5′.

13 **A. obtusifòlia** Mx. Simple, smooth; leaves oblong to oblong-ovate, subcordate, obtuse-mucronate; umbels 1—3, terminal, pedunculate, 15–25-flowered; hoods truncate, shorter than the sickle-shaped horn; flowers 6″, red-green. M., W., S. 3f.

14 **A. amplexicaùlis** Mx. Simple, flexuous, glaucous; lvs. ovate, cordate-clasping, obtuse, *not mucronate;* ped. lateral and terminal, with ∞ dull-purplish flowers; pedicels slender; hoods ovate, including the horns. Copses, S. 1—2f.

15 **A. tuberòsa** L. *Butterfly-weed.* Stem ascending, hairy, umbellate branched; leaves sessile, *alternate*, lance-oblong; umbels many, erect; flowers bright orange-red; hoods oblong; horns suberect. Dry fields. Root tuberous. Stem 2f. †

16 **A. paupércula** Mx. Smooth and virgate; leaves linear and oblong-linear, 4—6′ long; umbels with few large yellow-red flowers at the naked summit. N. J., and S.

17 **A. Curassávica** L. Half-shrubby and branching at base; branches terete, leafy to the top; leaves lance-linear; umbels with few large scarlet flowers. S. Fla. Cult.

18 **A. cinèrea** Walt. Stem wiry, simple, naked above; leaves linear-filiform, 1—3′, erect; umbels terminal, several, bracteolate, 3-5-flowered; peduncles 4—6″; pedicels 6—8″; corolla ashy-purple, 3—4″. Damp barrens, S. C. to Fla. 2—3f.

19 **A. virídula** Chapm. Stem and leaves as in No. 18; umbels 6-12-flowered, yellowish green, shorter than the leaves. Fla.

20 **A. Michaùxii** Dcsn. Stems diffuse; leaves linear, 3—4′, scattered; umbels ∞-flowered, often panicled, mostly shorter than the lvs.; fls. 3″, *fragrant.* Sands, S. 1f.

21 **A. verticillàta** Ell. Simple, slender, erect; leaves linear, very narrow, generally *verticillate;* umbels small, many, lateral, 1′ diameter, pedunculate. Swamps. 2f.

2. **ACERÀTES,** Ell. Hoods of the crown destitute of a horn. Otherwise nearly as in Asclepias. ♃ Flowers greenish. June—August.

§ ACERÀTES *proper.* Umb. lateral; pet. reflexed; crown adnate to anth. . .Nos. 1—3
§ ANÁNTHERIX. Umbels terminal; pet. spreading; crown free from anth. . Nos. 4, 5

1 **A. viridiflòra** Ell. Stout, whitish-downy; leaves thick, oval, obtuse, petiolate, varying to elliptic-lanceolate, or even to orbicular (Ga., Prof. Pond); umbels small, dense, subsessile. Sands. 2f. Leaves exceedingly variable.

2 **A. longifòlia** Ell. Rough-puberulent, simple; leaves alternate, lance-linear to linear; umbels lateral, pedunculate, densely many-flowered; flowers small, 3″, crown stipitate. Prairies, W. 2—3f. Peduncles 1′.

3 **A. lanuginòsa** Dcsn. Low, stout, hairy; leaves lanceolate; umbel 1, on the naked summit of the stem, dense; crown sessile. Prairies, Wis. 1f.

4 **A. connivens** Dcsn. Strict, half-shrubby; leaves oval-oblong; umbels 7-12-flwd., along the naked summit of the stem; pet. 5″, oval, with a short cusp; hoods *connivent* over the anthers. Barrens, Ga., Fla. 2f. Leaves 20—30″.

5 **A. paniculàtus** Dcsn. St. angular; lvs. lance-oblong, obtuse; umbels clustered at the leafy top, 5-9-flowered; pet. large, half-erect, 7″; pods glabrous, seeds with long silky tufts. Ga. to Ill. and Kan. (Rev. J. H. Carruth.)

3. **PODOSTÍGMA,** Ell. Cor. seg. 5, erect, oblong. Crown *stipitate*, hoods without horns. Follicles 2, long, slender, smooth. ♃ Low and simple, with opposite leaves and supra-axillary few-flowered umbels.

P. pubéscens Ell.—Wet grounds, S. A curious plant, with linear-oblong leaves and 3—5 umbels of yellowish-green flowers, in May, June. 1f.

4. **ENSLÈNIA,** Nutt. Cor. 5-parted, segments erect; hoods or scales

of the crown 5, free, each terminated by 2 filiform, flexuous lobes. Pollinia oblong, pendulous. Stig. 5-angled, conical. Follicles cylindraceous, smooth. ♄ A twining herb, with opposite, cordate leaves, and cream-white flowers in small lateral corymbs.

E. albìda N.—W. and S.: common. 6—10f. Clusters 5–8-flwd., fragrant. July, Aug.

5. METASTÉLMA, Br. Cor. somewhat bell-form, segments incurved at apex. Crown of 5 distinct scales. Stigma flat. Pods smooth, slender, seeds comous. ♄ Lvs. cuspidate, smooth. Umb. of few small flowers.

M. Fràseri Dcsn. Leaves oval; umbels sessile; pet. ovate, ciliate, as long as the linear crown-scales. In Carolina (Fraser, in DC.).

M. Schlectendahlii and other species grow in S. Fla. (Dr. Chapman.)

6. SEUTÈRA, Reich. Sepals 5, lanceolate. Cor. rotate, segm. acute. Crown on the base of the sessile anthers, of 5 retuse segments. Pollinia ovoid, pendulous. Stigma bifid. Pods smooth, seeds comous. ♄ Leaves linear, fleshy. Umbels few-flowered.

S. marítima Dcsn.—Salt marshes, S., twining on the rushes, &c. Leaves opposite, 1′. Umbels 7–10-flowered. Pet. greenish, crown short, white. June—October.

7. VINCETÓXICUM, Mœnch. Calyx and cor. 5-parted, wheel-form. Crown a fleshy, 5–10-lobed disk. Anth. tipped with a membrane. Pollinia and fruit as in Asclepias. ♃ ♄ Flowers small, in dense clusters.

1 **V. nigrum** Mœnch. Herb somewhat twining, with lance-ovate, attenuately-acute leaves and small blackish clusters in the axils. Gardens and fields: rare.

2 **V. scopàrium** (N.) Shrubby at base, much branched; leaves thin, linear, 1′; clusters short-stalked, downy, with few green flowers; pods slender, 1′. Fla.

8. GONÓLOBUS, Mx. Corolla subrotate, 5-parted, convolute in bud. Crown a small, fleshy, undulate-lobed ring, attached to the throat of the corolla. Anth. opening *transversely* beneath the stigma. Pollinia 5 pairs, horizontal. Pods turgid, seeds comous. ♄ Leaves cordate. Umbels few-flowered, short, extra-axillary. Flowers brownish.

* GONÓLOBUS *proper*. Cor. rotate, flat, lobes linear to oblong, smoothish...Nos. 1—3
* CHTHAMÀLIA. Corolla bell-form, small (woolly), lobes ovate, 1″ long ....No. 4

1 **G. macrophýllus** (and lævis) Mx. Smooth, or with minute down and scattered hairs; leaves short-pointed, base-lobes open; umbels 5-flowered, buds conic-pointed; pet. linear-subulate, 4″; pod smooth, ribbed. Shady banks, Va. to Ky., and S. 3—5f.

2 **G. oblìquus** Br. Hirsute with spreading, unequal hairs; leaves acuminate, base-lobes closed and some oblique; umbels 2-5-flowered, buds oblong, pet. linear-oblong, 6″; pod muricate, ribless. Banks, O. to Pa. and Ga. 3—5f.

3 **G. hirsùtus** Mx. Hirsute; leaves acuminate; umbels 5-8-flowered, buds ovoid. petals oblong, 3″, yellow, downy; pod muricate. Woods, South. 4—8f.

4 **G. prostràtus** Ell. Branches from base, prostrate, 6—12′; leaves small (1′), reniform-cordate; umbels sessile, 3-5-flowered; corolla segments ovate, 1″, very woolly inside, dark purple. Sands, Ga. (Dr. Feay). (Chthamalia pubera Dcsn.)

9. PERIPLÒCA, L. Cor. rotate, flat, 5-parted. Crown 5-cleft, tipped with 5 filiform awns. Filaments distinct, anthers cohering. Pollinia 5, each 4-lobed, single. Follicles 2, smooth, divaricate. Seeds comous. ♄

P. Græca L. Leaves ovate, acuminate, 3—4′; flowers panicled on a long peduncle; petals very hairy, linear, obtuse, purple. Gardens, &c. 10—15f. August. §

10. STEPHANÒTIS, Pet.-Th. Sepals distinct. Cor. salver-form, limb 5-lobed, convolute in bud, tube including the 5-leaved crown in its enlarged base. ♄ Leaves thick, very smooth.

S. FLORIBÚNDA. Leaves oval; flowers 5—8 on each peduncle, white and fragrant, tube 1′, limb 1½′ broad. Greenhouse plant, from Madagascar.

11. HOYA, Br. WAX-PLANT. Sepals 5. Corolla rotate, flat, valvate in bud. Crown of 5 depressed, spreading segm. Pollinia fixed by the base, connivent. Pods smooth, seeds comous. ♄ Smooth, fleshy.

H. CARNÒSA. Branchlets puberulent; leaves oval-oblong; flowers in dense umbels, pink-colored, wax-like. Greenhouse plant, from E. India.

12. STAPÈLIA, L. CARRION-FLOWER. Calyx 5-parted. Cor. rotate, fleshy, 5-cleft. Crown double, of 2 rings entire or lobed. Pollinia erect. Pods erect, smooth.—Fleshy, leafless, cactus-like plants, from S. Africa, with large, dark-red *fœtid* flowers, in the greenhouse.

S. HIRSÙTA, with erect, dull-green 4-sided branches, toothed on the angles, and flowers 3—4′ broad, with purple, ciliate, lance-ovate petals.

ORDER CI. OLEACEÆ. OLIVEWORTS.

Trees and *shrubs*, with opposite, simple or compound leaves, and regular, 4–8-parted *diandrous* flowers. *Corolla* rarely wanting, its divisions more in number than the stamens. *Ovary* free, 2-celled, with 2 (rarely 1 or ∞) ovules in each cell. Fig. 16.

I. JASMINEÆ. Corolla 5–8-parted. Ovary cells each with 1 erect ovule.. ....JASMINUM. 1
II. OLEACEÆ *proper*. Corolla valvate, 4-parted or 0. Ovary cells 2- or ∞-ovuled...(*)
  * Flowers perfect, corolla present. Leaves simple...(*a*)
  * Flowers imperfect, inconspicuous, often apetalous...(*c*)
    a Flowers yellow. Ovary with many ovules in each cell.......... ....FORSYTHIA. 2
    a Flowers white, or lilac. Ovary cells 2-ovuled...(*b*)
  b Stamens exserted. Fruit a fleshy drupe or berry.................................OLEUM. 4
  b Stamens included.—*x* Corolla salver-form, tube longer than lobes................SYRINGA. 3
    —*x* Corolla funnel-form, tube shorter than lobes................LIGUSTRUM. 5
    —*x* Corolla lobes long, linear, drooping........ ....CHIONANTHUS. 6
  c Leaves simple. Corolla 0. Fruit a fleshy drupe.... ....FORESTIERA. 7
  c Leaves pinnate. Corolla 0, or present. Fruit a winged samara.......................FRAXINUS. 8

1. JASMÍNUM, L. JESSAMINE. Calyx 5–8-lobed. Cor. salver-form, limb 5–8-cleft, convolute in bud. Sta. included. Berry double, 2-seeded. ♄ ♄ Petioles jointed.

§ Leaves opposite, unifoliate. Flowers white, 8–10-parted....................Nos. 1, 2
§ Leaves opposite, 3–9-foliate. Flowers white, 5-parted......... ....Nos. 3—5
§ Leaves alternate, 3–7-foliate. Flowers yellow, 5-parted......................Nos. 6, 7

1 **J.** SAMBAC. Scarcely climbing; leaves ovate; petals 8, rounded, fragrant. India.
2 **J.** LAURIFÒLIUM. Climbing; leaves lanceolate; pet. 9 or 10, linear, fragrant. India.
3 **J.** AZÒRICUM. Diffuse; leaflets 3, ovate, shining; flowers very fragrant. Azores.
4 **J.** OFFICINÀLE. Climbing; lfts. 7, lanceolate; sep. linear, equalling cor. tube. Asia.

5 **J.** GRANDIFLÒRUM. Climbing; leaflets 9, oval, some confluent, the odd one pointed; sepals thrice shorter than the corolla tube; petals oval. India.

6 **J.** REVOLÙTUM. Not climbing; lfts. ovate, pointed; pet. roundish, recurved. Asia.

7 **J.** ODORATÍSSIMUM. Climbing; lfts. oval, obtuse; fls. less fragrant than No. 6. Azores.

2. **FORSỲTHIA,** Vahl. Calyx very short, deciduous. Cor. subcampanulate, lobes long, twisted in bud. Sta. inserted in the base of the tube, included. Seeds ∞ in the 2-celled pod. ♄ Leaves opposite or in 3's, appearing after the yellow flowers.

1 **F.** VIRIDÍSSIMA. Branches erect, strict, covered with flowers in early Spring, each flower separate, pedicellate, lateral; leaves lanceolate. China.

2 **F.** SUSPÉNSA. Branches weak, pendulous; leaves ovate; flowers scattered. Japan.

3. **SYRÍNGA,** L. LILAC. Calyx small, persistent, many times shorter than the tube of the salver-form corolla. Sta. included. Pod 2-celled, valves bearing the septum in the middle, seeds 4. ♄ Leaves opposite.

1 **S.** VULGÀRIS. *Common L.* Leaves cordate-ovate, entire, glabrous; flowers *lilac* to lilac-purple, in a dense thyrse, very fragrant. A beautiful shrub, from Hungary; varying with flowers *bluish*, or *white*. April—June.

2 **S.** PÉRSICA. *Persian L.* Leaves lanceolate, acute, smooth, often pinnately cleft; thyrse loose, smaller, white, or lilac-blue. Persia.

3 **S.** VILLÒSA. *Chinese L.* Leaves elliptic, acute, hairy beneath. N. China.

4. **ÒLEA,** Tourn. OLIVE. Calyx short. Corolla tube short, limb 4-parted, spreading. Stamens 2, inserted in the base of the tube, exserted. Ovary with 4 suspended ovules, ripening only 1 or 2 seeds. Drupe fleshy, oily. ♄ ♄ Leaves opposite. Flowers white.

* Racemes axillary, shorter than the coriaceous leaves.....................Nos. 1—3
* Racemes in a large terminal panicle. (Visiana paniculata C-B).... ....No. 4

1 **O. Americàna** L. Leaves oblanceolate to elliptic, entire, smooth, shining, attenuated to a petiole; raceme compound, scarce longer than the petiole; flowers diœcious; drupes globular. Swamps, N. J. to Fla. 15—20f.

2 **O.** EUROPÆA. Leaves lanceolate, mucronate; racemes longer than the petioles; drupes oval. Europe. Cultivated in California, rarely far South. 20—40f.

3 **O.** FRÀGRANS. Shrub; leaves lance-oblong, *serrate;* flowers small, white, very fragrant, in axillary corymbs, white-red; *styles* 2. China. (Osmanthus.)

4 **O.** CLAVÀTA. Shrub with ovate entire leaves and many small flowers in large panicles; style 1, club-shaped, exserted like the stamens. China. Hardy S.

5. **LIGÙSTRUM,** L. PRIVET. PRIM. Cal. minutely toothed. Cor. funnel-form, 4-lobed. Sta. subincluded. Sty. very short. Berry 2-celled, 2–4-seeded. Sds. angular. ♄ With simple lvs. and term. panicles of white fls.

L. vulgàre L. Leaves lanceolate to obovate, 1—2′, obtuse or acute, thick but deciduous; flowers small, in small thyrses; anthers partly exserted, but shorter than the ovate corolla lobes. Planted in hedges. May, June. § Europe.

6. **CHIONÁNTHUS,** L. FRINGE TREE. Cal. short, 4-parted. Cor. tube very short, including the 2 stamens, the limb of 4 linear lobes. Style very short. Drupe fleshy, with a bony 1-seeded nut. ♄ ♄ With opposite leaves and white flowers in panicles.

C. Virgínica L. Leaves oval to oblong; panicle with filiform branches and pedicels;

petals very narrow, drooping, 10″. A highly ornamental shrub or small tree, in woods. S. Penn., and S. April—June.

7. **FORESTIÈRA,** Poir. Diœcious, apetalous; buds ∞-flowered. ♂ Flowers sessile, crowded, each flower a pair of stamens surrounded by a calyx of 4 sepals. ♀ Flowers pedicellate, umbellate, no calyx, an ovary tipped with a slender style and capitate stigma, cells 2, ovules 4. Drupe 1-seeded. ♄ ♄ Leaves opposite, simple. Flowers minute.

1 **F. acuminàta** Poir. Glabrous; leaves lance-elliptic, pointed both ways, serrulate, petiolate; drupe linear-oblong, pointed. Streams, Ill. to Ga. 15f.

2 **F. ligustrìna** Poir. Some downy; leaves ovate to oblong, obtuse, attenuate to a petiole, serrulate; drupe oval-oblong. Banks, Ga., Fla.

3 **F. porulòsa** Poir. Smooth; leaves lance-oblong, obtuse, sessile, dotted and rusty beneath; drupe round-ovoid. Coast of E. Ga. and Fla.

8. **FRAXÌNUS,** Tourn. ASH. Fls. ♂ ☿ ♀ or ♂ ♀. Cal. 4-toothed, rarely 0. Cor. of 2 or 4 oblong or linear petals, or 0. Sta. 2. Stig. bifid. Samara 2-celled, flattened, winged at apex, 4-ovuled, but 2-seeded. ♄ ♄ Leaves opposite, odd-pinnate, petiolate. Flowers racemed or panicled. Wood valuable for timber. April, May. Fig. 16.

§ Native species, all diœcious and apetalous, in woods, &c...(*a*)
§ European species, polygamous, planted for shade, &c........................Nos. 1, 2
  a Calyx persistent at the *terete* base of the samara..........................No. 3
  a Calyx persistent at the *narrow, flattened base* of the samara...........Nos. 4—6
  a Calyx none, the samara naked at the *broad* base.........................Nos. 7, 8

1 **F.** ORNUS. *Flowering Ash.* Lfts. 7—9, lanceolate, serrate above; buds pubescent; panicles dense; petals 2 or 4, linear-oblong, white; fruit lance-linear. Parks.

2 **F.** EXCÉLSIOR. *European Ash.* Leaflets 11—13, lance-oblong, serrate; racemes short, dense; fruit linear-oblong, notched at end; pet. and calyx 0. A tall tree, in parks, &c. β. PÉNDULA, the *Weeping Ash*, is one of its varieties.

3 **F. Americàna** L. *White Ash.* Leaflets 7—9, ovate, acuminate, subentire, shining; panicles loose; fruit calyculate, the seed portion terete, half as long as the oblong wing. A forest tree 40—80f. Timber excellent.

4 **F. pubéscens** Walt. *Red Ash.* Leaflets 7—9, lance-ovate, acuminate, subserrate, petioles and branchlets velvety-pubescent; fruit calyculate at the acute base, gradually widened into the oblanceolate wing. Wet woods. 30—60f.

5 **F. virídis** Mx. *f.* *Green Ash.* Lfts. 7—9, lance-ovate, serrate, long-pointed, bright green, and, with the petioles and branchlets, *glabrous;* fruit calyculate, spatulate, obtuse, the seed portion as long as the wing. Woods, W. and S. 15—25f.

6 **F. platycárpa** Mx. Leaflets 5—7, elliptical, acute, obscurely serrate, some downy; fruits broadly-spatulate, attenuate to the calyculate base, some of them (especially in β. ***triptera***) with 3 angles winged! Va., and S.

7 **F. quadrangulàta** Mx. *Blue Ash.* Leaflets 7—9, short-petiolulate, lance-ovate, acuminate, sharply serrate; branchlets square or acutely 4-angled; buds velvety; fruit oblong, winged to the base. Woods, W. 60—80f.

8 **F. sambucifòlia** Lam. *Black Ash.* Leaflets 7—11, lance-ovate, *sessile*, serrulate, pointed; fruit oblong with equal ends, notched at apex. Swamps, Can. to Pa. and Ky. 40—70f. Wood used for hoops, baskets, &c.

COHORT 3. APETALÆ,

OR MONOCHLAMYDEOUS EXOGENS. Plants with no corolla, the calyx or perianth green or colored, consisting of a single series of similar organs, or often wholly wanting.

ORDER CII. ARISTOLOCHIACEÆ. BIRTHWORTS.

Low herbs or *climbing shrubs*, with alternate leaves and perfect flowers. *Perianth* tube adherent to the ovary, brown or dull, valvate in the bud. *Stamens* 6 to 12, epigynous and adherent to the base of the styles. *Ovary* 6-celled, becoming a 6-celled, many-seeded capsule or berry. *Seed* albuminous, embryo minute. Figs. 24, 333.

1. ASÀRUM, Tourn. WILD GINGER. Calyx bell-form, regular, 3-cleft. Sta. 12, placed upon the ovary, anth. adnate to the middle or summit of the filaments. Style very short, stigma 6-rayed. Fruit fleshy, 6-celled, crowned with the calyx. ♃ Acaulescent, with creeping rhizomes and 1 or 2 leaves on each branch. Flowers solitary.

§ Leaves in pairs. Calyx lobes pointed, reflexed. Ovary wholly adherent......No. 1
§ Leaves solitary. Calyx lobes obtuse, suberect. Ovary partly free........ Nos. 2, 3

1 **A. Canadénse** L. Lvs. 2, broad-reniform, on long, opposite, radical petioles with the flower between; sepals greenish-purple, pointed, reflexed; filaments extended above the anthers. Rich shades. The root is a popular remedy. May, June.

2 **A. Virgínicum** L. Leaf orbicular-ovate, glabrous, coriaceous, deeply cordate, entire, obtuse; flowers subsessile; calyx short, smooth outside; segments obtuse, dull purple. Rocky soils, Va., Ky., and S. April.

3 **A. arifòlium** Mx. Leaf broadly hastate with a deep sinus; fl. 7—9″, tubular, soon urceolate, lobes short and obtuse. Rich soils, Va., and S. March—May.

2. ARISTOLÒCHIA, Tourn. BIRTHWORT. Calyx tubular, tube variously bent and inflected above the ovary, limb irregular. Anth. 6, subsessile on the style. Stig. 6-lobed. Caps. 6-celled, ∞-seeded. ♃ Caulescent, with alternate leaves and lateral lurid purple flowers.

§ Stem erect. Calyx tube sigmoid (*i. e.*, twice bent like the letter S)........Nos. 1, 2
§ Stem climbing, woody. Calyx tube recurved, once bent upward. May, Jn..Nos. 3, 4

1 **A. serpentària** L. *Virginia Snake-root.* Stem flexuous; lvs. petiolate, oblong or ovate, thin, cordate, acuminate; ped. radical, many bracted; cal. tube smoothish, contracted in the midst. Thickets, Pa., S. and W. 8—13′. June, July.

β. ***hastàta.*** Leaves narrowly oblong, auricled at base, short-stalked. S.

2 **A. reticulàta** N. St. very flexuous; lvs. oval, cordate-clasping, with decussating lobes, strongly reticulated; flowers radical, small (5″). La. 1f.

3 **A. Sipho** L'Her. *Dutchman's Pipe.* Lvs. glabrous, ample, round-reniform; ped. 1-flowered, with 1 clasping bract; flowers 1⅓′, bent like a *siphon* or tobacco-pipe, limb spreading. A vigorous climber, 30—40f, in hilly woods, Pa. to Ky., and S. †

4 **A. tomentòsa** Sims. Leaves downy or hairy beneath, round-cordate, very veiny; ped. solitary, 1-flowered, bractless; flowers 20″, tube yellowish, limb purple, reflexed, throat nearly closed. Banks, Ill., and S. 30—40f. May.

ORDER CIII. NYCTAGINACEÆ. MARVELWORTS.

Herbs (shrubs or trees) with tumid joints, entire and opposite leaves. *Flowers* generally surrounded with an involucre (calyx-like when the flower is solitary). *Calyx* a delicate, colored, funnel-form or tubular perianth, deciduous above the 1-celled, 1-seeded ovary, leaving its persistent base to harden and envelop the fruit (achenium) as a kind of pericarp. *Stamens* 1 to several, definite, slender, hypogynous, exserted, unequal. *Embryo* coiled around the copious white albumen. Figs. 143, 207.

§ Involucre just like a calyx, including one flower.......MIRABILIS. 1
§ Involucre 5-leaved, including many flowers in an umbel-like head.......ABRONIA. 2
§ Involucre 5-lobed, including 3—5 flowers.......OXYBAPHUS. 3
§ Involucre 0.—*x* Herbs, with minute flowers in little clusters.......BOERHAAVIA. 4
—*x* Shrubs. Flowers diœcious, cymous. S. Fla.......PISONIA.

1. MIRÁBILIS, L. MARVEL OF PERU. FOUR-O'CLOCK. Involucre calyx-like, 5-lobed, 1-flowered, lobes acuminate. Perianth (calyx) tubular-funnel-form, limb spreading. Sta. 5, and style more or less exserted. Fruit (as in all the genera) an achenium invested in the permanent base of the calyx. ♃ Cultivated. Leaves ovate, more or less cordate, acuminate.

1 **M.** JALÀPA. Erect, glabrous; flowers 3—6 in each terminal fascicle, short-stalked, opening at about 4 o'clock P. M., and remaining in bloom all night, infinitely various in color. Peru. 2f. Summer.

2 **M.** DICHÓTOMA. Erect, glabrous; flowers sessile, mostly yellow, smaller than in M. Jalapa; limb 6″. Mexico. 2f. Summer.

3 **M.** LONGIFLÒRA. Weak, diffuse, viscid-pubescent; lower leaves long-petioled; flowers sessile, tube 6′ long, hairy, border 1′, white. Mexico.

2. ABRÒNIA, Juss. Involucre 5-leaved, surrounding an umbel-like head of many small flowers on a long peduncle. Perianth salver-form, limb 5-lobed, corolla-like, deciduous. Sta. 5, and style included. ♃ Fleshy.

1 **A.** UMBELLÀTA. St. prostrate; lvs. ovate, long-petioled; umbellate heads compact; fls. rosy-lilac or pink, the lobes obcordate. Sandy sea-coasts, California. 1—2f.

2 **A.** FRAGRANS. Stem ascending; leaves lance-ovate, long-stalked; umbels loose, fls. and involucre white, tubes near 1′. Dalles, Oregon.

3. OXÝBAPHUS, Vahl. Invol. 5-cleft, containing 3—5 fls., persistent. Perianth tube very short, limb bell-form, plicate, deciduous. Sta. 3, and style exserted. Fruit obovoid, ribbed. ♃ Flowers small, purple.

1 **O. nyctagíneus** Sweet. Smoothish, erect, forked; lvs. broad-ovate to lanceolate, subcordate, acute; ped. solitary; involucre 3-5-flowered. Banks, W. June—Aug.

2 **O. angustifòlius** Sweet. Bushy, with alternate branches; lvs. lanceolate, acute both ways, subsessile, 1—2′; ped. ¼—½′, axillary; involucre cup-shaped, hispid, 3-flowered: ovary hispid. Dry soils, S. 2—3f. June—July.

3 **O. álbidus** Sweet. Stem with strict slender branches, or simple; leaves linear oblong, petiolate, the upper often bract-like; ped. half as long (6″—1′) as the leaves, involucre hairy, 3-flowered. S. 1—2f. May.

4. BOERHAÀVIA, L. Involucre 0, bractlets deciduous. Perianth funnel- or bell-form, colored, 5-lobed, upper half deciduous, lower persistent. Sta. 1—4. Fruit 5-ribbed, truncate at apex, 1-seeded. ① Leaves petiolate. Flowers very small.

B. erécta L. Glabrous; lvs. ovate, wavy, pale beneath; clusters 3–6-flwd., distant in a strict panicle with filiform branchlets. Sands, S. 2—4f. June—Sept.

B. hirsùta, and **B. viscòsa,** grow in S. Fla., according to Dr. Chapman.

ORDER CIV. POLYGONACEÆ. SORRELWORTS.

Herbs (rarely shrubs) with alternate leaves and mostly sheathing stipules (*ochreæ*) surrounding the stem above each tumid joint. *Flowers* mostly perfect. *Perianth* (or calyx) 3–6-cleft, mostly colored, imbricated in bud and persistent. *Stamens* 4—15. *Ovary* 1-celled, free, with a single, erect ovule. *Styles* or stigmas 2 or 3. *Fruit* a 3-angled achenium enclosed in the calyx. *Seed* erect, albuminous, with a curved embryo. Figs. 147, 151–4, 286, 304, 313, 337, 521.

§ Ochreæ, or sheathing stipules, present at each joint...(*b*)
§ Ochreæ none.—*a* Flowers in involucrate umbels, 6-sepalled........................ .ERIOGONUM. 1
—*a* Flowers in bracted racemes, 5-sepalled. Stems with tendrils.......BRUNNICHIA. 2
b Sepals 4, equal by pairs. Stamens 6. White Mountains: rare.....................OXYRIA. 3
b Sepals 6, all similar. Stamens 9. In gardens: common.........................RHEUM. 4
b Sepals 6, the 3 inner increasing, tuberculate.................................RUMEX. 5
b Sepals 5 (in one Polygonum 4 irregular)...(*c*)
c Sepals all or the 3 inner fringed. Pedicels solitary...........................THYSANELLA. 6
c Sepals all entire,—*x* open, or 3 closed on the fruit. Pedicels solitary... ....POLYGONELLA. 7
—*x* open at base of fruit. Pedicels fascicled......... ....FAGOPYRUM. 8
—*x* closed on the angular fruit. Herbs.....................POLYGONUM. 9
—*x* combined with the round fruit. Trees. Fla.............COCCOLOBUS.

1. ERIÓGONUM, Mx. Fls. many in each common 5-toothed involucre. Cal. deeply 5-cleft. Sta. 9, sty. 3. Ach. 3-angled or 3-lobed.—Herbs clothed with down or wool. Lvs. alternate, exstipulate, mostly at the base of the stem, the upper bract-like, often whorled at the forks of the umbellate inflorescence. Very abundant in the Pacific States. June—Aug.

1 **E. tomentòsum** Mx. Lower lvs. crowded, oblong-obovate, rusty-white beneath, the upper whorled in 3's; involucre sessile; calyx colored. ♃ Dry soils, S. 2—3f.

2 **E. longifòlium** N. Lower lvs. crowded, oblong-linear, white beneath, the upper scattered; involucre pedunculate; calyx green, woolly. Fla., and W. 2—4f.

2. BRUNNÍCHIA, Banks. Calyx colored, 5-parted, lobes oblong, at length increased and closed on the obscurely 3-angled achenium. Fil. 8, capillary, styles 3, slender, stigmas entire. ♄ Tendrils from the ends of the branches. Flowers racemed, greenish.

B. cirrhòsa Banks.—A smooth, shrubby vine, 10—20f, on river banks, Car. to Fla., and W. Leaves cordate to ovate, entire. Sheaths obsolete. May.

3. OXÝRIA, R. Br. MOUNTAIN SORREL. Cal. herbaceous, 4-sepalled, the 2 inner sepals erect, larger, the 2 outer reflexed. Ach. lens-shaped, thin, girt with a broad, membranous wing. Sta. 6, equal. Stig. 2, sessile, penicillate. ♃ Low, nearly acaulescent, alpine plants.

O. renifòrmis Hook (or digyna Camp.) Root leaves on long stalks, reniform; outer sepals ½ as long as the inner; fruit orbicular. White Mountains, and N. 3—4′. June.

4. **RHEUM,** L. RHUBARB. Calyx colored, 6-sepalled, persistent. Sta. 9. Sty. 3, very short, spreading, stig. multifid, reflexed. Ach. 3-angled, the angles margined. ♃ Flowers fasciculate in racemous panicles.

R. RHAPÓNTICUM L. *Pie-plant.* Leaves smooth, cordate-ovate, very large (1—2f), the petioles juicy and pleasantly acid, of equal length; stems hollow, 3—4f, panicles bursting from large white bracts. Siberia.

5. **RUMEX,** L. DOCK. SORREL. Calyx of 6 sepals nearly distinct, the 3 inner (valves) larger, petaloid, connivent over the achenium, 1 or more of them usually bearing a tubercle or grain on the back, the 3 outer green. Sta. 6. Styles 3, short, stigmas penicillate-fringed. Ach. and seed 3-angled, embryo lateral.—Weed-like herbs with small, greenish flowers, often whorled, in racemes or panicles. May—July.

§ Docks. Flowers all or mostly perfect. Valves bearing grains on the back...(*)
§ Sorrels. Flowers diœcious. Valves grainless. Leaves acid (hastate)....Nos. 11, 12
  * Valves entire, or merely angular...(*a*)
  * Valves conspicuously toothed on each side near the base.... .. ....Nos, 8—10
    a Pedicels in fruit 2—5 times longer than the *subcordate* valves......Nos. 1—3
    a Pedicels in fruit shorter or not longer than the valves...(*b*)
      b Leaves flat, all tapering to both ends.........................Nos. 4, 5
      b Leaves wavy, the lower cordate or subcordate..................Nos. 6, 7

1 **R. crispus** L. *Yellow D.* Root fusiform, yellow; lvs. lanceolate, wavy, acute, the lower oblong, subcordate; ped. twice longer than calyx; valves broad-ovate, cordate, each bearing a grain; rac. long, some leafy. ♃ Fields. 2—3f. § Europe.

2 **R. verticillàtus** L. *Water D.* Leaves acute at each end, lance-oblong; rac. leafless, dense; ped. 7—9″ long, deflexed; valves broad-ovate, each bearing a large grain. ♃ In muddy places. 2f. Whorls 10-30-flowered.

3 **R. Hydrolápathum** Huds. *Great Water D.* β. ***orbiculàtus.*** Tall (3—5f); lvs. lance-obl., acute both ways, erose-crenulate, the lower very long; pan. naked, dense: ped. 5—6″; valves round-ovate, obtuse, all grain-bearing. ♃ Pools, M. and N.

γ. ***Floridànus.*** Valves deltoid-ovate, obtusely-pointed. Fla.

4 **R. altíssimus** Wood. *Peach-leaved D.* Tall (3—6f); leaves entire, lance-elliptical, acute both ways; rac. leafless, panicled, slender; valves broadly subcordate, one of them grain-bearing, one obscurely so, and one naked. ♃ Wet, M. and W. (R. Britannicus Meisn. nec Linn. who says "valves all grain-bearing.")

5 **R. salicifòlius** Weinm. *Pale D.* Lvs. lin.-lanceolate, attenuate-acute both ways; pan. leafy at base; ped. very short; valves all grain-bearing. ♃ Coast, N-E. 3f.

6 **R. conglomeràtus** Murr. Lvs. oblong to lanceolate, lower subcordate; whorls mostly axillary; valves oblong-ovate, all grain-bearing. ♃ Wet. N. 2—3f. §

7 **R. sanguíneus** L. Lvs. as in No. 6, mostly with red veins; pan. leafy at base, whorls distant; valves oblong-obovate, one or two grain-bearing. ♃ Fields. §

8 **R. obtusifòlius** L. Lower leaves ovate-cordate, obtuse, upper narrow, acute; panicle leafy, whorls distant; valves hastate-ovate, one chiefly grain-bearing, all with some bristle-shaped lateral teeth. ♃ Fields, &c. 2—3f. § Europe.

9 **R. marítimus** L. *Golden D.* Low (1f); leaves lance-linear, the lowest cordate, wavy; whorls crowded; valves rhomb-ovate, pointed, each with 4 lateral awns and a large grain, yellowish. ① Brackish waters, Mass. to Car.

10 **R. pulcher** L. Lower lvs. cordate, some fiddle-shaped, upper lanceolate; whorls distant, leafy; valves strongly toothed, unequally grain-bearing. S. §

11 **R. Acetosèlla** L. *Sheep Sorrel.* Leaves oblanceolate, the base lobes conspicuous; valves not increasing in fruit. A common weed. 6′—1f.

12 **R. hastulàtus** Baldw. Leaves with small auricles or none, glaucous; valves increasing to round-cordate in fruit; ped. jointed. Mo. to Ga.: rare.

6. THYSANÉLLA, Gray. Fls. ♂ ☿ ♀. Cal. colored, 5-parted, lobes all erect, the 2 outer cordate, the 3 inner smaller, pectinate-fringed. Sta. 8. Styles 3. Achenia 3-angled, acuminate.—A smooth, erect herb, with the habit of Polygonella. (Polygonum, Ell.)

T. fimbriàta Gr.—Pine-barrens, Ga., Fla. Stem branched, 2—3f. Sheaths bristle-fringed. Lvs. linear, 1—2′. Fls. rose-white, in crowded, panicled spikes. July—Oct.

7. POLYGONÉLLA, Mx. Calyx colored, 5-sepalled, persistent. Sta. 8, included. Styles 3 or almost 0. Ach. 3-cornered, naked or enclosed in the 3 inner sepals enlarged and become scarious valves. Embryo straight. —Herbs or delicate shrubs, with very narrow leaves and the small flowers solitary in each ochrea.

§ Fls. diœcious. Pedicel 1″. Filaments all filiform. Stig. nearly sessile...Nos. 1—3
§ Fls. all ☿. Pedicel 2″. The 3 inner filaments dilated. Styles manifest...Nos. 4, 5

1 **P. parvifòlia** Mx. Shrubby, branches strict, leafless above; lvs. linear-cuneate; panicle oblong; inner sepals equalling the acute achenia. S. 1—2f.

2 **P. grácile** N. Annual, glaucous; branches filiform; leaves spatulate; 3 inner sepals exceeding the pointed achenia. Dry sands, S. 2—3f.

3 **P. Croomia** Chapm. Shrubby; branches slender; leaves linear (2—3″); 3 valves unequal, 2 roundish, 1 oblong, exceeding the achenia. Uplands, S.

4 **P. Meisneriàna** Shutt. Shrubby, very leafy, leaves linear, filiform, 6—10″, evergreen, ochrea tipped with a white membrane; 2 outer sepals reflexed. Uplands, Ga., Ala., Fla. 1—2f. A delicate bushy shrub.

5 **P. articulàta** Meisn. Annual, strict, with erect branches, which are soon nearly naked; leaves linear, caducous from the tops of the truncate sheaths; sepals flesh-colored, expanding. Dry. N. J., and W.: rare.

8. POLÝGONUM, L. KNOT-GRASS. Calyx of 5 sepals, rarely fewer, colored or greenish, similar, imbricated in bud, at length all connivent, persistent. Sta. 8, rarely fewer. Sty. 2 or 3, mostly 3, short filiform. Ach. 3-cornered or lens-shaped, enclosed in the dry, withered calyx. Embryo curved, lateral, lying in a groove at one angle of the albumen. Herbs with ochreate-jointed stems and small, white, red, or greenish fls. June—Sept.

§ Stems armed with retrorse prickles. Lvs. cordate-sagit. ECHINOCAULON..Nos. 21, 22
§ Stems unarmed, twining. Leaves cordate-hastate. TINIARIA............Nos. 18—20
§ Stems erect or decumbent, unarmed. Leaves hardly ever cordate...(*)
  * Calyx unequally 4-cleft. Styles 2, long deflexed. TOVARIA................No. 17
  * Calyx equally 5-parted. Styles erect...(*a*)
    a Sheaths salver-form. Stamens 7. Style 2-parted. Tall. AMBLYOGONUM...No. 16
    a Sheaths subcylindrical. Stamens 5, 6, 8. Styles 2 or 3...(*b*)
      b Flowers in leafless, terminal, spike-like racemes. PERSICARIA...(*c*)
      b Flowers axillary, or seldom forming a leafy raceme...(*e*)
        c Raceme 1, dense. Stem at base or rhizome decumbent....Nos. 14, 15
        c Racemes several. Sheaths naked, not fringed..............Nos. 12, 13
        c Racemes several. Sheaths bristly, fringe-ciliate...(*d*)
      d Style 2-(or 3-)cleft. Achenia flat or lens-shaped...............Nos. 9—11
      d Style 3-cleft. Achenia sharply 3-cornered......................Nos. 5—8
        e Achenium protruding beyond the calyx, 3-angled ....Nos. 3, 4
        e Achenium included in the calyx, 3-angled..................Nos. 1, 2

1 **P. aviculàre** L. *Bird's K. Doorweed.* Procumbent, diffuse; leaves lance-ellip-

tic, acutish, 1′; flowers 2 or 3 together, subsessile, reddish; achenia striate, dull, enclosed; stamens 5—8. ① A common weed, 6—16′. In rich shady soils it arises to

β. ***eréctum,*** with larger oval leaves and pedicellate flowers.

2 **P. ténue** Mx. Slender, rigid, erect, with long simple-angular branches; lvs. linear, erect; sheaths bristle-fringed; flowers solitary; achenia shining. Dry. ½—1f.

3 **P. marítimum** L. Prostrate, diffuse, glaucous, with very short joints and swelling torn sheaths; lvs. fleshy, oblong, 1—6″; fls. sessile, at length spicate; fruit little exserted, smooth and shining. ① Sandy coasts, Mass. to Ga. ½—1f.

4 **P. ramosíssimum** Mx. Erect or ascending, *much branched*, striate; lvs. linear-oblong, 1—2′; flowers greenish, pedicellate; fruit ½ exserted, olive-green, shining, 1½″. ① Sandy shores, R. I. to Mich. and Md. 2—3f.

5 **P. hirsùtum** Walt. Densely hirsute with spreading tawny hairs, erect; lvs. lanceolate; sheaths fringed; flowers white, in 2 or 3 slender spikes. ② S. 2—3f.

6 **P. hydropiperoìdes** Mx. *Mild Water-pepper.* Stem smooth, slender, sheaths long, close, fringed and hispid; lvs. linear-lanceolate, not acrid; spikes erect, slender, loose at base; calyx glandless; achenia shining.

β. ***setàcea*** the leaves and stem above are more or less hispid. ♃ Wet. 1—3f.

7 **P. acre** H. B. K. *Water Smartweed.* Glabrous, virgate, slender; sheath loose, bristle-fringed; lvs. lanceolate, *acrid;* spikes filiform, erect; flowers reddish-green, dotted like the leaves; fruit shining. ① Wet places. S. and W. 2—5f.

8 **P.** TINCTÒRIUM. *Madder.* Lvs. oval; spikes oblong, dense, roseate. China. 1—2f.

9 **P. Hydropìper** L. *Water Pepper.* Glabrous; sheaths bristly-ciliate; lvs. lanceolate, very acrid, finely punctate; spikes nodding, loose, slender, greenish; calyx punctate; stamens mostly 6; achenia roughened, black. ① Damp. 1—2f. §

10 **P. Càreyi** Olney. Stem erect, 3—5f, bristly and much branched; leaves lanceolate, some hispid; stipules tubular-truncate, ciliate; spikes dense, purplish, nodding on long hairy peduncles. ① Swamps, N. Eng. to Penn.

11 **P. Persicària** L. *Smart-weed.* Glabrous, erect; leaves lanceolate, usually marked with a brown spot; sheaths fringed; spikes dense, erect, oblong; stamens 6; style 2-cleft; achenia shining. ① Waste grounds: common. 1—2f. §

12 **P. Pennsylvánicum** L. Branches above and pedicels glandular-hispid; leaves lanceolate; spikes erect, oblong, crowded, rose-colored, showy; achenia lens-shaped, with flat sides. ① Margins of waters. 2—4f.

β. ***densiflòrum.*** Smooth; racemes slender; achenia truly lens-shaped. South.

13 **P. incarnàtum** Ell. Smoothish; leaves lanceolate; branches and ped. glandular-dotted; spikes linear, nodding, becoming long; achenia lens-shaped, with concave sides. ① Ditches and pools, W. and S. 2—3f.

14 **P. amphíbium** L. Stem prostrate and rooting below, ascending; leaves thick, smooth, lance-oblong, variable; spikes oblong, ovoid or dense; stamens 5; style 2-cleft. Pools and swamps. 3—4f. Spike 1′ or more.

β. ***terrestre.*** Plant more or less hirsute; spikes elongated.

15 **P. vivíparum** L. Low, simple, erect from a creeping rhizome; leaves lance-linear, with rolled edges; spike 1, linear. ♃ White Mountains, and N.

16 **P. orientàle** L. *Prince's Feather.* Tall, erect, branched; leaves large, with hairy salver-form sheaths; stamens 7; styles 2; spikes large, red, nodding, showy. ① Fields and gardens. 3—8f. §

17 **P. Virginiànum** L. Stem simple; leaves lance-ovate, acuminate; flowers remote, 1 from each sheath, in a slender raceme, greenish. ♃ Shades. 3—4f.

18 **P. convólvulus** L. *Knot Bindweed.* Prostrate or climbing, roughish, sheaths naked; leaves hastate, pointed; flowers in axillary fascicles or in interrupted racemes; fruit exserted, dull, blackish. ① Fields. 2—4f. §

19 **P. cilinode** Mx. Climbing; sheaths *ciliate* at base; leaves deeply cordate, pointed; racemes paniculate, loose; achenia shining. Hedges. 3—8f.

20 **P. dumetòrum** L. *Hedge Bindweed.* Climbing high; joints not ciliate; leaves

cordate-hastate, with acute lobes; outer sepal keeled and winged on the back; fruit smooth, black. Thickets. 3—12f. §.—A native form,

β. ***scandens***, has the raceme panicled and the sepals with very broad wings.

21 P. sagittàtum L. *Scratch-grass.* Climbing, 3—5f, rough backwards; leaves lance-sagittate; flowers in small heads, whitish; stamens 8; style 3. ① Wet.

22 P. arifòlium L. Rough with reversed prickles, 3—5f; leaves hastate, apex and lobes pointed; flowers racemed; stamens 6; styles 2. Wet.

9. **FAGOPÝRUM**, Tourn. BUCKWHEAT. Calyx colored, equally 5-parted, persistent, unchanged. Stamens 8, alternate with 8 honey-glands. Styles 3, with capitate stigmas. Ach. 3-angled, much exceeding the calyx. ① Leaves cordate-hastate. Flowers rose-white, in panicled racemes.

1 F. esculéntum Mœnch. Smoothish; leaves with obtuse lobes; flowers showy, numerous, sought by bees: achenia ovoid-triangular, wingless, black. Fields. 2—4f. §

2 F. TARTÁRICUM. *India Wheat.* Glabrous; leaves broader than long, lobes acutish; racemes axillary and terminal, scarcely panicled; achenia lance-triangular, angles sinuate-dentate, rather obtuse; calyx minute. Tartary. Cultivated.

ORDER CV. PHYTOLACCACEÆ. POKEWORTS.

Herbs with alternate, entire leaves and perfect, 5-parted flowers. *Calyx* free. *Stamens* 5—30, alternate with the sepals when of the same number. *Ovary* of 1 to several carpels, each 1-ovuled. *Styles* and *stigmas* as many as carpels *Fruit* baccate or acheniate. *Seeds* erect, with the embryo coiled around the albumen.

§ Styles and carpels 5—12. Fruit baccate. Leaves exstipulate.......... ....PHYTOLACCA. 1
§ Style and carpel 1. Leaves with stipules.—*a* Berry globular, smooth... ....RIVINA. 2
—*a* Achenium with 2 hooks.............. . PETIVERIA. 3

1. **PHYTOLÁCCA**, Tourn. POKE. GARGET-WEED. Calyx 5-parted. Stamens 5—25. Styles 5—12. Berry depressed-globular, with as many seeds as styles.—Herbaceous. Racemes terminal, soon opposite the leaves.

P. decándra L. Stem stout, purplish, tall; leaves ovate; flowers with 10 stamens and 10 styles; berries black, full of crimson juice. Hedges. 5—8f. July +.

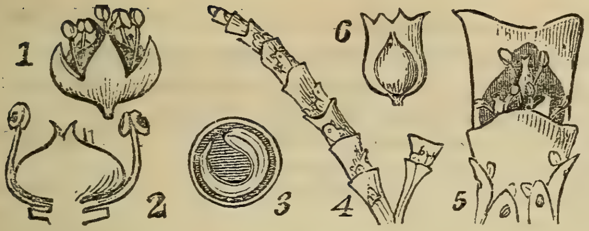
2. **RIVÌNA,** Plum. Calyx 4-parted, 3-bracted. Sta. 4 or 8. Berry at last dry, 1-seeded, embryo a vertical ring. Shrubby, with racemes terminal, soon lateral.

R. lævis L. Branching, smooth, 6—8f; lvs. ovate; fls. rose-white, in long racemes; stamens 4. Fla., and W. Herbage bright-green.

3. **PETIVÈRIA** ALLIÀCEA L. Half-shrubby, 2—3f, with obovate-obtuse leaves and spicate flowers. Grows in S. Car. (Michaux), and S. to the tropics.

ORDER CVI. CHENOPÓDIACEÆ. CHENOPODS OR GOOSE-FOOTS.

Herbs chiefly weed-like and homely, more or less fleshy, with alternate, exstipulate *leaves.* *Bracts* not scarious. *Flowers* greenish, regular. *Calyx* imbricated in bud. *Stamens* as many as, and opposite to the calyx lobes, or fewer. *Ovary* 2-styled, 1-celled, becoming a 1-seeded, thin utricle or caryopsis. *Embryo* coiled or spiral.



1. Flower of Chenopodium album. 2. Calyx, &c., removed, showing the ovary and 2 stamens. 3. Seed cut across, showing the coiled embryo. 4. Branch of Salicornia herbacea. 5. Two joints magnified. 6. Ovary of a flower.

§ Leaves flat, neither fleshy nor spiny. Embryo a ring around copious albumen...(*a*)
§ Leaves none, or linear and fleshy or spinescent. Embryo a spiral or folio. Albumen 0...(*y*)
a Stems twining and climbing. Flowers white, in racemes.....................BOUSSINGAULTIA. 1
a Stems erect. Flowers greenish, all similar and perfect...(*b*)
a Stems erect. Flowers greenish, of two sorts, monœcious or diœcious...(*x*)
b Seed horizontal.—*c* Pericarp rough and corky. Calyx ribbed...............BETA. 2
—*c* Pericarp thin, in a calyx bordered all around.......CYCLOLOMA. 3
—*c* Pericarp thin, in a plain, unbordered calyx...........CHENOPODIUM. 4
b Seed vertical.—*d* Fruit smooth, sepals distinct, mostly fleshy...............BLITUM. 6
—*d* Fruit in a veiny, wrinkled calyx. Leaves pinnatifid....ROUBIEVA. 5
—*d* Fruit axillary to a bract, no calyx. Leaves linear......CORISPERMUM. 10
x Fruit enclosed in a hardened calyx without bracts. Cultivated..........SPINACIA. 9
x Fruit naked (no calyx) between two bracts. Leaves oval or triangular...ATRIPLEX. 7
y Embryo folded, not spiral. Stems jointed, leafless....................SALICORNIA. 11
y Embryo a flat spiral, horizontal. Leaves acute.........................CHENOPODINA. 12
y Embryo a conic spiral. Sepals appendaged. Leaves spinescent......SALSOLA. 13

1. **BOUSSINGAÚLTIA,** Kunth. MEXICAN VINE. Cal. corolla-like, open, 5- or 6-parted, with several imbricated bracts. Stig. 3, club-shaped. Pericarp thin. ♄ Twining to the right. Leaves thick, petiolate. Flowers in many spike-like racemes. S. America.

B. BASELLOÌDES. Leaves broadly cordate-ovate, acuminate. ♃ Arbors. 15f.

2. **BETA,** Tourn. BEET. Cal. 5-cleft, persistent. Sta. 5. Ovary half-adherent. Stig. 2. Utricle depressed, corky, enclosed in and consolidated with the ribbed calyx.—Herbs with fleshy roots, furrowed stems, alternate leaves, and greenish, spicate flowers.

B. vulgàris. Glabrous; leaves large, wavy, acute both ways; spikes in a large panicle the second year. ② S. Eur. Cultivated for its root, which is commonly red.
β. ***Cicla.*** *Scarcity.* Leaves roughish; root slender, whitish; flowers in 3's.
γ. ***Rapa.*** *Turnip Beet.* Root napiform, white or red, very sweet.
δ. ***Mangel-wurtzel.*** Root very large, mostly white. Cultivated for stock.

3. **CYCLOLÒMA,** Moquin. Calyx 5-cleft, lobes strongly keeled, at length appendaged outside with a circular membranous border or crown. Sta. 5, styles 3. Utricle depressed, enclosed. ① With furrowed stems, alternate lobed leaves, and small sessile flowers.

C. platyphýllum Moq.—Banks of the Mississippi, Ill., and W. 1—1½f, white-downy above. Leaves lance-oblong, sinuate-toothed or lobed, 2′. Flowers at length in small panicles. July—Sept.

4. **CHENOPÒDIUM,** Tourn. PIGWEED. GOOSEFOOT. Calyx bractless, 5-cleft, lobes often keeled, never appendaged, more or less enclosing the fruit. Sta. 5, styles 2. Utricle depressed, membranous, seed mostly

horizontal, lenticular. Weeds often glaucous or glandular, with alternate, often rhombic lvs., and the minute fls. in panicled spikes. June—Aug.

§ Plants ill-scented, smooth, never glandular. Embryo a complete ring...(*)
§ Plants glandular-puberulent, green, aromatic. Embryo a half ring...(*b*)
  * Herbage glaucous or whitish, covered with mealiness................Nos. 1—3
  * Herbage green, rarely purplish, not glaucous or mealy...(*a*)
    a Leaves entire, ovate-oblong, on slender petioles ....No. 4
    a Leaves toothed or lobed, petiolate.................................Nos. 5—7
      b Flowers glomerate, axillary, in spike-like racemes.............Nos. 8, 9
      b Flowers cymous, innumerable, in long raceme-like panicles......No. 10

1 C. glaùcum L. Prostrate or ascending, branched; leaves ovate to oblong, obtuse, sinuate-angled or -dentate; racemes simple; seed partly enclosed. ① Mass. to Pa.: rare. 1f. Leaves 1—2′, whitish beneath. § Europe.

2 C. album L. *Common P.* Erect, loosely branched, striate; lvs. rhombic ovate, sinuate-toothed to subentire; racemes some panicled; seed wholly enclosed. ① The commonest of weeds, 2—7f, often striped with purple.

3 C. Bosciànum Moq. Erect, branched; lvs. small, lance-linear, entire, canescent beneath; seed partly enclosed. ① Shades, Pa. (Prof. Porter), and S. 2f.

4 C. polyspérmum L. Ascending, branched from base; lvs. ovate to oblong, entire, bright green; racemes spike-like, strict; fruit partly enclosed. Rare. § Eur.

5 C. hýbridum L. Leaves ample, subcordate, deeply sinuate-angled, with pointed lobes; racemes leafless; seed rugous, dull. ① Common, 2—4f. § Europe.

6 C. muràle L. Ascending; leaves ovate-rhombic, acute at base, unequally and acutely toothed; seed acute-edged, dull-rugous. ① Rare. 12—18′. §

7 C. úrbicum L. Erect; leaves as in No. 6, but slightly mealy; racemes strict, dense, in an erect narrow panicle; seed blunt-edged, shining. ① 2—4f. §

8 C. ambrosioìdes L. *Mexican Tea.* Branched; leaves oblong to lance-linear, attenuate both ways, sinuate-toothed to entire; spikes dense, leafy, seed shining, obtuse-edged; fruit wholly enclosed. ① 1—2f. § Mexico.

9 C. anthelmínticum L. *Worm-seed.* Subsimple; leaves ovate-oblong, deeply sinuate-serrate or pinnatifid; racemes spike-like, long; styles mostly 3; fruit as in No. 8. ♃ Waste grounds. 1—3f. § Mexico.

10 C. Botrys L. *Oak-of-Jerusalem.* Leaves oblong, obtuse, sinuate-subpinnatifid; branches strict, panicles slender, spirally twisted. ① Sands, &c. 1—2f. Plants strongly aromatic of turpentine.

5. **ROUBIÈVA,** Moq. Calyx 5-toothed. Sta. 5. Styles and stig. 3. Seed lens-shaped, quite vertical, enclosed in the veiny rugous calyx. ♃ Pubescent, much branched. Leaves pinnatifid.

R. multífida Moq.—Roadsides about New York. Prostrate and ascending. 1—2f. Flowers minute, in numerous panicled racemes. Leaves 1′. § S. America.

6. **BLITUM,** Tourn. BLITE. Calyx 3–5-sepalled, mostly becoming juicy and berry-like in fruit, enclosing the utricle. Sta. 1—5. Styles 2. ① Leaves petiolate. Flowers glomerate.

§ Heads forming a dense terminal spike. Calyx dry...........................No. 1
§ Heads axillary, some spicate above. Calyx thickened.....................Nos. 2, 3

1 B. Bonus-Henricus Reich. *Good King Henry.* Subsimple, ascending, mealy; leaves triangular-hastate; stamens 5. Waysides, N.: rare. § Europe.

2 B. marítimum N. Much branched; leaves lanceolate, attenuate to both ends; stamen 1; seed shining. Marshes, R. I., N. Y., and N. J. 1—2f. August.

3 B. capitàtum L. *Strawberry B.* Branched; leaves triangular-hastate; glomerate fruit reddened like strawberries, insipid. Va., and N. 1—2f. June.

7. ÁTRIPLEX, Gært. ♂ Bractless. Calyx 3–5-sepalled. Sta. 3—5. ♀ Ovary 2-styled, with no stam., enclosed between 2 leaf-like bracts, with or without a calyx.—Herbs or shrubs, often mealy or scurfy, with opposite or alternate hastate leaves and glomerate-spiked green flowers.

§ Leaves partly opposite. Bracts triangular-ovate........................Nos. 1, 2
§ Leaves all alternate.—*x* Bracts rhombic, canescent, toothed ....No. 3
—*x* Bracts round-ovate or -cuneate....................Nos. 4, 5

1 **A. hastàta** L. Slender, weak, green; leaves petiolate, hastate, remotely-toothed; flowers single in the slender spikes, bracts triangular-ovate, denticulate. N. Eng. to S. Car., coastward. 1—3f.—β. ***Purshiàna*** is scurfy.

2 **A. littoràlis** L. Erect with many strict branches; leaves short-stalked, lanceolate to linear, subentire; flowers glomerate, forming interrupted spikes; bracts hispid, triangular-hastate, denticulate. Lake shores, N-W.

3 **A. ròsea** L. Canescent, ascending, branched; lvs. ovate to oblong, sinuate-toothed; glomerules axillary, bracts rhombic, toothed. Albany, N.Y. (Prof. Porter). 2f. § Eur.

4 **A.** HORTÉNSIS. *Garden Orache.* Erect, branched; lvs. triangular-hastate or -oblong, subentire, bright green; bracts roundish, entire. Asia.

5 **A. arenària** N. *Sand Orache.* Mealy-canescent, branched; leaves oval to oblong, entire, short-petioled; bracts broad-cuneate, united, denticulate. ① Sea-beaches, Mass. to Fla. (Obione, C-B.) 6—12′. July—Sept.

9. SPINÀCIA, Tourn. SPINAGE. Diœcious, bractless. ♂ Cal. 3–5-sepalled. Sta. 4 or 5, exserted. ♀ Calyx tubular, 2- or 4-toothed, soon hardening and enclosing the compressed achenium. Styles 4. ① Leaves petiolate. Flowers green, axillary. June, July.

S. OLERÀCEA. Leaves hastate-lanceolate to arrow-shaped; fruit-calyx solitary, 3-angled' armed with 2 or 4 slender prickles, or unarmed. ① Gardens. 1—2f.

10. CORISPÉRMUM, Juss. Calyx 1–2-sepalled or 0. Stam. 1—5. Styles 2, short. Pericarp oval, flat and thin, adnate to the seed, vertical. ① With narrow, sessile leaves, and sessile, solitary, axillary flowers.

C. hyssopifòlium L. Hairy or glabrous, much branched; flowers in many bracted spikes, bracts ovate, subulate-pointed; leaves 1′ and less; fruit a pellucid disk. Sandy lake-shores, Buffalo, and W. §

11. SALICÓRNIA, Tourn. SALTWORT. SAMPHIRE. Flowers 2 or 3 together, sunk in the cavities of the jointed stem. Calyx bladder-like, denticulate, enclosing the compressed vertical fruit. Stamens 1 or 2. Styles 2. Embryo folded.—Seaside, jointed, fleshy herbs almost leafless, with opposite branches.

1 **S. herbàcea** L. Suberect; spikes elongated, green; joints truncate and bractless; middle flower largest. ① Salt marshes. 8—12′. August.

2 **S. Virgínica** L. Erect; spikes short, soon red; joints short, tipped with 2 acute bracts; flowers all alike. ♃ Salt marshes. 6—9′. Sept. (S. mucronata C-B.)

3 **S. fruticòsa** L. Prostrate, with ascending branches; spikes slender, joints tipped with 2 obtuse bracts. ♃ Sandy beaches. (S. ambigua C-B.)

12. CHENOPODÌNA, Moq. GLASSWORT. Calyx bracteolate, cup-shaped, 5-parted, fleshy in fruit with the seed horizontal. Sta. 5. Stigma sessile. Embryo a flat spiral.—Smooth seaside fleshy plants, with alternate sessile leaves and axillary flowers. (Suæda, Forsk.)

C. marítima Moq. Diffusely branched; lvs. linear, 2′ and less, semiterete; flowers minute, green, clustered, sessile; seed black, shining. ① Marshes. August.

13. SÁLSOLA, Gært. SALTWORT. Fls. ☿ sessile. Sep. 5, transversely-winged on the back. Wings enlarged and scarious in fruit. Sta. 5. Styles 2. Utricle depressed, horizontal. Embryo cochleate.—Seaside fleshy plants, with terete leaves and axillary, whitish flowers.

S. Kali L. Branches diffuse on the sand, rigid, with crowded subulate leaves, each tipped with a spine; flowers solitary, wings purplish; seed with a thin testa and green embryo coiled like a snail-shell. ①

ORDER CVII. AMARANTACEÆ. AMARANTHS.

Herbs similar to the last Order, but with an imbricated involucre of 3 dry, scarious bracts added to the flowers. *Sepals* 3—5 (rarely but 1), persistent and often colored, unchanged in fruit. *Stamens* 3—5. *Ovary* compressed, 1-celled, 1–∞-ovuled. *Style* 1. *Fruit* a utricle, caryopsis or berry. *Seed* vertical, albuminous. *Embryo* annular.

§ Anthers 2-celled. Ovary with many ovules. Cultivated..............................CELOSIA. 1
§ Anthers 2-celled. Ovary 1-ovuled. Leaves alternate...(*)
§ Anthers 1-celled. Ovary 1-ovuled. Leaves opposite...(*a*)
  * Flowers monœcious or polygamous, all with a calyx and stamens..................AMARANTUS. 2
  * Flowers diœcious, the pistillate with neither calyx nor stamens..................ACNIDA. 3
    a Sterile stamens none.—(Flowers white, paniculate)..........................IRESÌNE. 4
    a Sterile stamens none.—(Flowers crimson, &c. Capitate. Cultivated)......GOMPHRENA. 5
    a Sterile stamens 5, the 5 fertile in a tube.—*x* Heads axillary.................TELANTHERA. 6
                            —*x* Spikes terminal and axillary....FRŒLICHIA. 7

1. CELÒSIA, L. COCKSCOMB. Fls. perfect, 3-bracted. Calyx of 5 sepals. Sta. 5, anth. 2-celled. Stig. 2 or 3, recurved. Utricle circumscissile, many-seeded, more or less enclosed in the calyx.—Herbs or shrubs, smooth, erect, with alternate leaves and brilliant, scarious flowers.

1 **C.** CRISTÀTA. Leaves lance-ovate; spikes ovoid-pyramidal, varying in cultivation to fantastic shapes, crimson or even white. ① E. India. 2—4f.

2. AMARÁNTUS, Tourn. AMARANTH. Fls. ♂ ☿ ♀ or ⚥, 3-bracted. Cal. of 5 or 3 sepals. Stamens 3—5, rarely 2, anth. 2-celled. Stig. 2 or 3. Fruit a 1-seeded utricle, circumscissile, or tearing, or not opening. ① Coarse weeds, with alternate petioled lvs. and minute fls. in clusters. Aug.

§ AMARÁNTUS *proper*. Utricle thin, regularly circumscissile. Not spiny...(*a*)
§ EUXÒLUS. Utricle somewhat fleshy, indehiscent, or tearing open...(*c*)
  a Flowers 5-parted, in long panicled spikes,—*b* crimson-tinged..........Nos. 1, 2
                            —*b* green....................Nos. 3, 4
  a Flowers 3-parted, in separate, axillary, dense glomerules... ....Nos. 5, 6
    c Spines 2 in each axil. Bracts not longer than the 5 sepals............No. 7
    c Spines none.—*x* Bracts longer than the 3–5-sepalled calyx.........Nos. 8, 9
              —*x* Bracts shorter than the 5-sepalled calyx........Nos. 10, 11

1 **A. hypochondrìacus** L. *Prince's Feather.* Smoothish; leaves lance-oblong, on long stalks, some reddened; spikes very obtuse, the terminal one much the largest; flowers deep purple. Fields and gardens. 3—6f. § Mexico.

2 **A. paniculàtus** Moq. *Prince's F.* Pubescent, pale-green; leaves lance-ovate

spikes slender, acutish, crowded, all nearly equal. reddish-green, or in β. ***sanguineus***, crimson; bracts short-awned. Fields and gardens. 2—3f. § Mexico.

3 **A. retrofléxus** L. Pubescent, erect, stout; leaves ovate or subrhombic, obtuse-pointed; panicle of thick, crowded, dense spikes; bracts awned, longer than calyx. A common weed in gardens and fields. 2—4f. Plant green or glaucous. §

4 **A. hýbridus** L. Erect, glabrous, green; leaves ovate, bright green; panicle loose; spikes terete, obtuse; calyx shorter than the awned bracts. § Mexico.

5 **A. albus** L. *White Pigweed.* Whitish, diffusely spreading; leaves long-petioled, rhomb-ovate, very obtuse; glomerules remote, in pairs, 4- or 5-flowered: common. §

6 **A. melanchólicus.** *Love-lies-bleeding.* Erect, usually dark-purple; leaves lance-oblong, obtuse, emarginate; glomerules dark-purple. Asia. 2—4f.

β. ***tricolor.*** Leaves variegated with purple, green, and yellow.

7 **A. spinòsus** L. Much branched; leaves rhomb-ovate, obtuse, with 2 spines in each axil; spikes panicled, erect, acute; bracts equalling the sepals; utricle falling without opening. Waysides, Penn. to Fla., and W. §

8 **A. lìvidus** Moq. Erect, smooth, livid-purplish; lvs. elliptic, obtuse, emarginate; spikes slender, rigid, acute; sepals thrice longer than bracts; fruit rugous. §

9 **A. defléxus** L. Ascending, ashy-green, branches deflexed; leaves rhomb-lanceolate, obtuse; spikes thick, obtuse; sepals longer than bracts; fruit smooth. §

10 **A. víridis** L. Erect; livid-purple; leaves long-petioled, ovate; spikes panicled, rather loose and long; sepals twice longer than the bracts. Waste grounds, S.

11 **A. pùmilus** Raf. Diffuse or prostrate; leaves subsessile, obovate; flowers in axillary, sessile glomerules; fruit twice longer than the calyx. Sandy sea-coasts.

3. **ACNÌDA**, L. WATER HEMP. Fls. ♂ ♀, 3-bracted. ♂ Calyx of 5 equal, erect sepals. Stamens 5, anth. 2-celled. ♀ Cal. 0. Ovary 1-ovuled, with 3—5 stig. Utricle 1-seeded, naked. ① Glabrous, tall, branched, with long-stalked, entire leaves and fls. small, green, in slender spikes. Jl.—Oct.

§ ACNÌDA *proper*. Utricle indehiscent, longer than its stigmas................No. 1
§ MONTÈLIA. Utricle circumscissile, shorter than its stigmas..................No. 2

1 **A. cannabìna** L. Leaves lanceolate to linear. *pointed*, 2—8′; ♂ spikes numerous, rather dense, 2—4′; ♀ spikes interrupted; panicle leafy; fr. 1¼′, obovoid, bracts ¼ as long. Salt marshes. 3—8f. The two sorts quite dissimilar.

2 **A. tamariscìna.** Leaves lance-oval, 1—5′; spikes interrupted and leafy at base, or throughout; ♀ bracts longer than the ovary. Wet shores, E. and W. 1—6f. The ♂ plant scarcely differs from ♂ No. 1.

4. **IRESÌNE**, Br. Fls. ♂ ♀ or ☿, 3-bracted. Calyx of 5 erect sepals. Sta. 5, anth. 1-celled. Stigmas 2 or 3. Utricle valveless, included in the calyx.—Leaves opposite, petiolate. Flowers minute, scarious, white, in dense spikes or heads. September, October.

I. celosioìdes L. Branches opposite, strict; leaves ovate-lanceolate; flowers in numerous delicate panicled spikes. ① Banks, W. and S-W. 2—4f.

5. **GOMPHRÈNA**, L. GLOBE AMARANTH. Fls. 3-bracted. Cal. 5-sepalled, erect. Fil. 5, 3-cleft at apex, middle tooth bearing the 1-celled anth. Stig. capitate. Fr. as in Iresine. Tropical plants. Lvs. opposite. Flowers in heads.

G. GLOBÒSA. Trichotomously much branched; leaves oblong, entire; flowers fadeless, bright purple, in heads 1′ diameter. ① E. India. 1—2f.

6. **TELÁNTHERA**, Br. Fls. 3-bracted. Cal. of 5 sepals. Stamens 5,

with 5 intervening sterile filaments, anth. 1-celled. Stig. capitate. Fr. as in Iresine. Leaves opposite. Heads axillary and terminal.

T. polygonoìdes Moq. Procumbent, diffuse, hairy; leaves oval, obtuse, attenuate to a winged petiole; flowers silvery whitish. ♃ Waste grounds, S.

7. **FRŒLÍCHIA,** Mœnch. Fls. 3-bracted. Calyx tubular, 5-cleft at apex. Sta. 5, connate into a tube, with 5 sterile filaments. Anth. 1-celled. Stigmas capitate or tufted. Utricle enclosed in the hardened calyx. ① Hairy or woolly stems, long-jointed.

F. Floridàna Moq. Nearly simple, strictly erect; leaves linear; flowers in short, dense, cottony spikes. River banks, W. and S. 1—3f. July, August.

ORDER CVIII. LAURACEÆ. LAURELS.

Trees and *shrubs* aromatic, mostly with alternate, simple, punctate *leaves.* *Flowers* with a colored perianth of 4—6 slightly united, strongly imbricated sepals. *Anthers* 2- or 4-celled, opening upward by as many recurved, lid-like valves. *Ovary* 1-celled, 1-ovuled, free, in fruit a berry or a drupe. *Seed* without albumen.

§ Flowers perfect. Stamens 12, the 3 inner sterile.—*a* Evergreen trees................PERSEA. 1
—*a* Leafless vines. S. Fla.........CASSYTA.
§ Flowers diœcious. Stamens 9, all fertile. Leaves deciduous...(*)
* Involucre none. Anthers 4-celled, 4-valved. Leaves lobed..................SASSAFRAS. 2
* Involucre 4-leaved. Anthers 2-celled, 2-valved. Leaves entire..............BENZOIN. 3
* Involucre 4-leaved. Anthers 4-celled, 4-valved. Leaves entire..............TETRANTHERA. 4

1. **PÉRSEA,** Gært. RED BAY. BAY GALLS. Fls. ☿, umbellate, with no involucre. Cal. of 6 sepals. Sta. 12, the 3 inner sterile, reduced to mere glands, anth. 4-celled (2 cells above and 2 below). Drupe oval, seated on the persistent calyx, containing 1 large seed. ♄

P. Carolinénsis Mx. Tree 30—40f, often but a shrub, with lance-oblong, entire, firm leaves, 6′; umbels small, on ped. 1—2′; drupe oval, blue. Swamps, Va. to Fla. Bark deep-furrowed; wood fine, rose-colored. April, May.

2. **SÁSSAFRAS,** Nees. SASSAFRAS. Fls. ♂ ♀. Calyx 6-parted, deciduous. ♂ Sta. 9, the 3 inner with a pair of glands at base, anth. 4-celled. ♀ Sta. 6, all sterile. Ov., style, and stig. 1. Drupes ovoid, blue, on thick red pedicels. ♄ Flowers yellow, appearing before the leaves in Mar.—Jn.

S. officinàle Nees. Shrub or small tree, 10—20f; leaves of two forms—ovate and entire, or 3-lobed, cuneate at base; flowers handsome, in racemes or corymbs. Fields and woods. Bark pleasantly aromatic.

3. **BÉNZOIN,** Nees. SPICE WOOD. Flowers ♂ ♀, with 4 involucrate scales. Cal. 5- or 6-parted. ♂ Sta. 9, the inner 3 glandular at base, anth. 2-celled. ♀ Sta. 15—18 rudiments. Drupe obovoid, red. ♄ ♄ Lvs. entire. Fls. yellow, in small lateral clusters before the leaves. (Lindera, Thunb.)

1 **B. odoríferum** Nees. Shrub 6—12f; leaves lance-obovate, acute at base; buds and pedicels smooth. Moist woods: common. May.

2 **B. melissæfòlium** Nees. Shrub 2—3f; leaves lance-oblong, abrupt or cordate at base; buds and pedicels villous. Swamps, S. February, March.

4. TETRÁNTHERA, Jacq. POND SPICE. Fls. as in Benzoin, but the anthers are 4-celled and 4-valved as in Sassafras. Drupe globular (red). ♄ Flowers yellow, precocious. February, March.

T. geniculàta Nees. Shrub 8—15f, with branches and branchlets very crooked and divaricate. Leaves small, oval to oblong. Swamps, S.

ORDER CIX. LORANTHACEÆ. LORANTHS.

Shrubby plants, parasitic on trees, with thick, opposite, exstipulate leaves. *Flowers* mostly diclinous, an adherent *calyx* of 2—8 lobes, with *stamens* of the same number, opposite the calyx lobes. *Ovary* 1-celled, becoming a fleshy fruit with one albuminous seed.

PHORODÉNDRON, N. MISTLETOE. Fls. ♂ ♀, in jointed spikes, mostly 3-lobed. ♂ Anth. sessile on the base of each lobe, the 2 cells divergent. ♀ Stig. sessile (no stamens). Fr. a pulpy, viscous berry.—Herbage yellowish-green. Stems brittle, woody, firmly engrafted on the limbs of oaks, elms, &c.

P. flavéscens N. Stems much branched, 1—1½f; leaves wedge-obovate, thick, entire, as long as the spikes; berry white, pellucid, sticking to the limb which it touches until it takes root.

ORDER CX. SANTALACEÆ. SANDALWORTS.

Trees, *shrubs*, and *herbs*, with alternate, undivided leaves, with the *calyx* tube adherent to the ovary, limb 4–5-cleft, valvate. *Stamens* as many as the sepals, and opposite to them. *Ovary* 1-celled, with a free central placenta bearing at top 2—4 suspended ovules, but in *fruit* drupaceous, 1-seeded, crowned with the persistent calyx.

§ Half-shrubby. Anthers connected to the sepals by a tuft of hairs.......................COMANDRA. 1
§ Shrubs. Anthers free.—* Flowers 4-parted, with 4 petals in the ♀ flowers..............BUCKLEYA. 2
—* Flowers 5-parted, all apetalous. Leaves alternate...........PYRULARIA. 3

1. COMÁNDRA, N. BASTARD TOADFLAX. Calyx tube adherent, limb 4- or 5-parted. Anth. 4 or 5, connected as above mentioned. Fil. on a 5-lobed perigynous disk.—Smooth plants, with herbaceous branches and whitish flowers in small umbels.

1 **C. umbellàta** N. Flowers perfect; branches strict, corymbed above; leaves oblanceolate, subsessile; umbels 3-flowered, exceeding the leaves; connecting hairs yellow. Rocky woods. 1f. Leaves scattered, 9″. June.

2 **C. Darbya** A. DC. Flowers diœcious; branches short, leafy; leaves elliptical, mostly opposite; umbels 5-flowered, shorter than the leaves; connecting hairs white. Woods, S.: rare. 1—2f. The fertile plant unknown.

2. BUCKLÉYA, Torr. Fls. ♂ ♀, the ♀ with a double calyx, the inner (corolla) caducous, and without stamens. Sty. 4-lobed. ♂ Calyx single, 4-lobed, with 4 stam. Fruit oblong, 10-furrowed, 1-seeded. ♄ Leaves subsessile, entire. Sterile flowers clustered, fertile solitary.

B. distychóphylla Torr.—Mountains of E. Tenn. Shrub 10—20f; leaves ovate, acuminate; fruit 8—9″ long, resembling that of Forestiera.

3. **PYRULÀRIA,** Mx. OIL-NUT. Fls. ♂ ♀. Calyx 5-cleft, half-adherent by the 5-toothed disk. Style 1, stigmas 2 or 3. Drupe pear-shaped, 1-seeded, with the albumen very oily. ♄

P. pubèra Mx. Shrub 4—6f, spineless, with oval-oblong leaves and small greenish flowers in terminal racemes; drupe 7—9″. Mountain streams, Pa., and S. May.

ORDER CXI. THYMELACEÆ. DAPHNADS.

Shrubs with a very tough, acrid bark, entire leaves and perfect flowers, with the calyx tubular, colored, the limb 4-(4- or 5-)parted, regular, the tube bearing the *stamens*, as many or usually twice as many as its lobes, and free from the *ovary*, which is 1-celled, 1-ovuled, the suspended seed with little or no albumen.

1. **DIRCA,** L. LEATHERWOOD. Cal. colored, tubular, limb obscurely 4-toothed. Sta. 8, exserted. Style 1. Berry 1-seeded. ♄ Fls. opening before the oblong-obovate, alternate leaves, 3 from each bud.

D. palústris L. Shrub 3—5f, along streams, with very tough bark; flowers 4″, yellowish, in April, May; berry oval, small, red.

2. **DAPHNE,** L. Cal. colored, funnel-form, limb spreading, 4-parted. Anthers 8, subincluded. Stigmas capitate. Berry fleshy, 1-seeded. ♄ Native of the Old World.

1 **D.** MEZÈREUM. Shrub 1—3f, with very smooth lanceolate leaves appearing later than the lateral clusters of rose-purple, sweet-scented flowers.

2 **D.** ÒDORA. Shrub 2—3f; leaves lance-oblong, evergreen; clusters terminal, roseate, very fragrant. Greenhouse.

3 **D.** LAURÈOLA. Shrub 1—5f, hardy, with large oblanceolate, shining, evergreen leaves and axillary clusters of greenish flowers.

ORDER CXII. ELÆAGNACEÆ. OLEASTERS.

Shrubs or *trees* usually with the leaves covered with a silvery scurf, entire. *Flowers* mostly diœcious, the calyx free, entire, persistent, becoming in *fruit* pulpy and berry-like, enclosing the 1-celled, 1-seeded achenium. Embryo straight, with little albumen.

* Flowers perfect. Stamens 4. Leaves alternate, petiolate, entire.................... ELEAGNUS. 1
* Flowers diœcious. Stamens 8. Leaves opposite, after the flowers.................... SHEPHERDIA. 2
* Flowers diœcious. Stamens 4. Leaves alternate, after the flowers.................... HIPPOPHÆ. 3

1. **ELÆÁGNUS,** L. OLEASTER. Cal. 4-cleft, colored within. Sta. 4, alternate with the sepals. Achenium enclosed in the mealy, 8-furrowed calyx tube. ♄ ♄ With silvery foliage.

1 **E.** ARGÉNTEA Ph. *Silverberry.* Shrub 8—12f; leaves broadly or narrowly elliptical, acute, 1—2′; flowers axillary, deflexed, canescent. Dakota, and W.

2 **E.** HORTÉNSIS. Tree with narrow-lanceolate, acute leaves; flowers axillary, erect.—Also, **E.** LATIFÒLIA, with evergreen leaves, is cultivated.

2. **SHEPHÉRDIA**, N. Fls. ♂ ♀. Cal. 4-cleft. Sta. 8, with 8 glands. ♀ Calyx tube closely investing the ovary, limb 4-lobed. Sty. and stig. 1. Berry globular, fleshy. ♄ Spinescent.

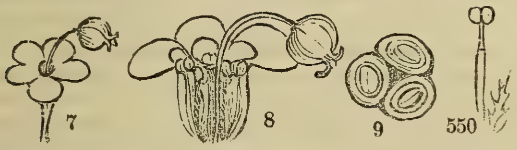
1 **S. Canadénsis** N. Shrub 6—8f; leaves elliptic-ovate, clothed beneath with stellate hairs and rusty scales, nearly smooth above. Banks of streams, N. Clusters subsessile. Berry sweetish.

2 **S.** ARGÉNTEA N. *Buffalo Berry.* Tree 12—18f; leaves oblong-ovate, obtuse, both surfaces smooth and covered with silvery scales. Fruit the size of a currant, scarlet, well-flavored. Missouri.

3. **HIPPÒPHÆ** RHAMNOÌDES. Shrub with lance-linear leaves, silvery white beneath, and a crowd of yellow, acid drupes. Europe.

ORDER CXIII. EUPHORBIACEÆ. SPURGEWORTS.

Herbs, *shrubs*, or *trees*, usually with a milky, acrid juice. *Flowers* diclinous, sometimes enclosed in a cup-shaped involucre. *Calyx* inferior, sometimes wanting. *Corolla* scale-like or colored, often wanting. *Ovary* free, sessile or stipitate, 2-, 3-(or more)-carpelled; styles distinct or united. *Fruit* of 2, 3 (or more) 1–2-seeded carpels (rarely of 1 carpel) united to a common axis, at length separating. *Embryo* in fleshy albumen. Fig. 142.



547. Head or capitulum of Euphorbia corollata. 8. The involucre tube cut open, showing the monandrous, staminate flowers surrounding the pistillate. 9. One of the ♂ flowers, with a toothed bract at base. 50 Cross-section of the ovary, showing the 3 one-seeded cells or carpels.

§ Cells of the ovary 1-ovuled ; fruit cells or carpels 1-seeded...(*)
§ Cells of the ovary 2-ovuled ; fruit cells or carpels each 2-seeded...(*x*)
  * Flowers in a cup-shaped involucre, the ♂ many, each merely a stamen, the ♀ only 1,—an ovary exserted on a pedicel..EUPHORBIA. 1
  * Flowers not in an involucre, ☿, all apetalous, with a calyx only...(*a*)
    a Stigmas and carpels 6—9. Fruit fleshy, apple-like. Trees. S. Fla....HIPPOMANE *Mancinella.*
    a Stigmas and carpels 3. Fruit dry, capsular...(*b*)
  b Stamens erect in the bud, 2—4 in number...(*c*)
  b Stamens erect in the bud, 8—∞ in number...(*d*)
  b Stamens inflexed in the bud. ♂ Flowers usually with small petals...(*e*)
    c Staminate calyx imbricated in bud. Anthers pendulous. Tree. S. Fla....SEBASTIANIA *lucida.*
    c Stam. calyx imbricated in bud. Anthers erect. Flowers in spikes..........STILLINGIA. 2
    c Stam. calyx valvate in bud. Flowers in racemes. Plant downy..........TRAGIA. 3
      d Flowers in cymes, with white, imbricated sepals. Stinging............JATROPHA. 4
      d Flowers in small spikes with large bracts. Sepals valvate............ACALYPHA. 5
      d Flowers in long interrupted spikes. Sepals 3, valvate in bud...........MERCURIALIS. 6
      d Flowers in panicles. Leaves palmately lobed, glabrous...............RICINUS. 7
    e Ovary 3- or 2-celled and -seeded. Plants hairy, downy, &c.................CROTON. 8
    e Ovary 1-celled and -seeded. Plants silvery-scurfy...........................CROTONOPSIS. 9
  x Calyx 5–6-parted ; stamens 3, united. Flowers axillary, small..................PHYLLANTHUS. 10
  x Calyx 4-parted ; stamens 4, distinct, large. Flowers in bracted spikes........PACHYSANDRA. 11
  x Calyx 4-parted ; stamens 4, distinct. Fls. axillary. Shrub. Lvs. opposite....BUXUS. 12

1. **EUPHÓRBIA**, L. SPURGE. Fls. monœcious and achlamydeous, several in an involucrate cluster, simulating one flower (see figures). In-

volucre calyx-like, 4- or 5-lobed, often with 4 or 5 large glands. ♂ Fls. 9 or more, each a stamen with a bract. ♀ Flower central, a 3-celled, 3-ovuled ovary on a pedicel. Styles 3, 2-cleft. Caps. 3-lobed, separating into 3 nutlets.—Plants with a milky juice.

§ Shrubs of the greenhouse, with scarlet bracts or involucres.............Nos. 33—35
§ Herbs, erect, without stipules. Leaves alternate or opposite...(*a*)
§ Herbs, mostly prostrate, diffuse. Leaves all opposite, oblique at base, small, furnished with small stipules at base. Glands of the involucre 4, usually white-margined. ① May—Nov....(*x*)
a Glands of the involucre 5, bordered with white petaloid appendages...(*b*)
a Glands of the involucre 4 or 5, crescent-shaped or 2-horned...(*c*)
a Glands of the involucre 1—5, neither white nor horned...(*d*)
  b Heads pedunculate. Branches regular. Leaves oblong to linear.......Nos. 1, 2
  b Heads pedunculate. Branches irregular. Leaves oval or ovate........Nos. 3, 4
  b Heads nearly sessile. Leaves with broad white margins...................No. 5
c Umbel of many rays. Stem leaves narrow, alternate. Seeds smooth. ♃...Nos. 6, 7
c Umbel of 3 rays, and forked. Stem leaves alternate, thin...............Nos. 8, 9, 10
c Umbel of 3 or 4 rays, and forked. Stem leaves opposite, thick.............No. 11
  d Inflorescence a simple terminal cluster. Leaves toothed or lobed....Nos. 12, 13
  d Inflorescence a forked cyme, peduncles in the forks. Lvs. entire....Nos. 14, 15
  d Inflorescence a compound umbel. Heads terminal...(*e*)
    e Seeds reticulated or wrinkled. Leaves serrulate.................Nos. 16, 17
    e Seeds smooth and even,—*k* in a rough, warty fruit..............Nos. 18—20
    —*k* in a smooth and even fruit..........Nos. 21—23
  x Leaves serrulate or serrate. Seeds roughened with wrinkles or pits...(*y*)
    y Stems ascending or erect. Plants smooth or smoothish.........Nos. 24—26
    y Stems flat on the ground, spreading, mostly hairy................Nos. 27, 28
  x Leaves entire. Seeds smooth and even. Plant glabrous...........Nos. 29—32

1 **E. corollàta** L. *Flowering S.* Erect, glabrous, or subglabrous; umbel 3–7-rayed, rays 3- and 2-forked; lvs. oblong to oblong-linear, obtuse, those of the umbel whorled or opposite; involucre glands obovate, petaloid. ♃ Dry fields, 1—2f. July, Aug.
β. ***angustifòlia.*** Leaves oblong-linear; umbel becoming irregular. S.

2 **E. Curtísii** Eng. Smooth, slender, branched from base, divisions about 3-forked, then 2-forked; leaves opposite or in 3's, linear-oblong or linear; heads minute; involucre glands narrowly white-bordered. ♃ Barrens, S. 1f. (E. discoidalis Chapm.)

3 **E. pubentíssima** Mx. Hairy, 2 or 3 times forked; leaves oval or ovate-oblong, petiolate or subsessile, scattered, the floral much smaller; heads minute; involucre glands minutely white-margined, entire. Dry. S. 1f. (E. paniculata Ell.)

4 **E. mercurialìna** Mx. Stem naked below, leafy, and 3- or 2-forked above, pubescent; leaves oval or ovate, petiolate, mostly opposite; involucre *lobes crenulate*, white. Tenn.: rare. 8—10′. Too near to the preceding.

5 **E. marginàta** Ph. Leaves lance-oblong, sessile, the floral crowded, and with a broad white margin; umbel 3-rayed, capitate. ① Ky., and W. 1f. †

6 **E. Cyparíssias** L. Lvs. linear, much crowded, the floral broad-cordate, all sessile; umbel of many simple rays; glands lunate. ♃ Fields and gardens. 1f. §

7 **E. Esula** L. Lvs. lance-linear, the floral broadly cordate; umbel of many forked rays, and scattered branches below; glands 2-horned. Fields: rare. §

8 **E. Peplus** L. Leaves round-cuneate, the floral ovate; umbel of 3 (rarely 5) forked rays; carpels doubly wing-keeled on the back. Fields, N. Eng.: rare. § Europe.

9 **E. Ohiótica** Steud. Smooth, erect from a decumbent branching base; lvs. mostly floral, reniform, sessile, the pairs appearing orbicular; carpels not winged; glands 2-horned. ♃ Woods, Ohio, W. and S. 1f. (E. commutata Eng.)

10 **E. tetrápora** Eng. Leaves linear-spatulate, the floral larger, transversely ovate; umbel 3-rayed; *seeds 4-pitted* on the inner face. ① Ga. to La. 10′.

11 **E. Lathȳris** L. *Caper S.* Stout, 2 or 3f high; leaves sessile, lance-linear, all opposite; umbel 4-rayed, then forked; glands horned. Gardens, and §.

12 **E. heterophȳlla** Mx. Stem with scattered branches, 1—3f; leaves ovate, or sinuate-lobed, or panduriform, all petiolate and scattered, the upper stained red on the margins; gland 1, sessile. Iowa to Ga. June, July.

13 **E. dentàta** Mx. Stem 8′—2f, hairy, with opposite branches; leaves opposite, ovate, *dentate*, petiolate; heads subsessile; seed tubercled, round and black; gland 1 or more, stalked. ① Shades, Penn. to Iowa and La.

14 **E. Ipecacuánhæ** L. Root long, stems clustered, slender, diffusely forked; lvs. opposite, all oblong to linear, obtuse, sessile; heads on filiform pedicels; seed white, compressed, pitted. ♃ Sands, coastward. 8—12′. (E. gracilis Ell.)

15 **E. nudicaùlis** Chapm. Slender, forking above; leaves minute (¼″), obovate, the upper opposite; heads minute, glands margined, greenish. ♃ Fla.

16 **E. Helioscòpia** L. Stout; umbel 5-rayed, rays trifid, and forked; lvs. cuneate to obovate, whorled above; glands round, stalked. ① Waysides, N. §

17 **E. dictyospérma** F. & M. Slender; umb. once or twice 3-forked, then 2-forked; floral leaves roundish-ovate, subcordate, cauline oblong-spatulate to obovate; fruit warty, *seeds reticulated.* ① Ky., and S-W. (E. Arkansana C-B.)

18 **E. Darlingtònii** Gray. Tall (2—3f); umbel 5-8-rayed, rays forked or trifid; leaves entire, oblanceolate, the floral oval. ♃ Woods, Penn., and S.

19 **E. platyphȳlla** L. Erect, 8—16′; umbel 5-rayed; leaves lance-oblong, subcordate, serrulate, the floral triangular-ovate. ① Lake shores, N. §

20 **E. obtusàta** Ph. Erect, 1—2f; umbel 3-rayed, rays trifid or forked; leaves all sessile, serrulate, obtuse, the floral roundish-cordate, the lower oblanceolate; fruit very warty. ① Woods, Va., and W.

21 **E. inundàta** Torr. Smooth, erect; umbel 3-rayed, and forked; leaves entire, sessile, lanceolate to oblong-ovate; glands round, entire; seeds globous. ♃ Wet barrens, Fla. 6—12′. Heads on slender peduncles. Root woody.

22 **E. sphærospérma** Shutt. (E. Floridana Chapm.) Lvs. lance-linear to cordate-ovate; heads green, glands crenate. Otherwise like No. 21. ♃ Dry. Fla. 1—2f.

23 **E. telephioìdes** Chapm. Plant some fleshy, 2—5′ high; lvs. ovate, large on the stem, small on the umbel. Otherwise like No. 22. ♃ West Fla. May, June.

24 **E. hypericifòlia** L. St. 1—2f; lvs. 6—12″, oval-oblong, serrate all around; sds. oval, obtusely 4-angled, wrinkled and tubercled, black. ① Fields: common.

25 **E. glyptospérma** Eng. St. 5—10′; lvs. 4—6″, linear-oblong, serrulate toward the apex; stip. fringed; sds. ovoid, obtuse-angled, wrinkled, amber-color. Wis., and S-W.

26 **E. maculàta** L. Hairy; leaves oblong, serrulate, often with a brown spot; stip. minute; seeds sharply angled, obscurely wrinkled, reddish. Sandy fields: common.

27 **E. humistràta** Eng. Hairy; lvs. elliptic-obovate, serrulate at apex, rarely spotted; stipules fringed; seeds obtuse-angled, oval, roughened, brownish. Banks, W.

28 **E. serpyllifòlia** Pers. Smooth; lvs. obovate-oblong, serrulate at apex, seldom spotted; stipules fringed; seeds acutely 4-angled, cross-wrinkled. Banks, W.

29 **E. polygonifòlia** L. Lvs. oblong-linear; glands of invol. not appendaged; seeds large (1″ long), ovoid, smooth and whitish. Sandy sea and lake coasts.

30 **E. Geyeri** Eng. Leaves oblong-obovate; glands with narrow appendages; seeds small (½″), ovoid, acute, obtusely 3-angled, ash-colored. Sandy soils, N-W.

31 **E. serpens** H. B. K. Lvs. round-ovate, very small (1—2″); stip. triangular; glands scarcely appendaged; pod acutely keeled, seeds ovoid-3-angled. Ill. to La.

32 **E. cordifòlia** Ell. Lvs. 4—6″, cordate-oval; glands conspicuously white-appendaged; pods and seeds as in No. 31. Fields, South. Spreading 1f.

33 **E.** SPLENDENS. Shrubby and fleshy, thorny; lvs. ovate, acute both ways; ped. axillary; floral leaves in pairs, broader than long, scarlet. Madagascar.

34 E. FULGENS. Not spiny; lvs. lanceolate, pointed both ways, floral lvs. soon falling; lobes and appendages of the involucre red and purple. Mexico.

35 E. PULCHÉRRIMA (or Poinsettia). Floral leaves lanceolate, of a brilliant red, lower leaves wedge-oblong, often fiddle-shaped, all pointed. Mexico.

2. STILLÍNGIA, Gard. Fls. ⚥, in a terminal, dense spike, apetalous. ♂ Calyx cup-form, lobed and crenulate. Sta. 2 or 3. Fil. exserted, with short, 2-lobed anthers. ♀ Calyx 3-lobed. Style trifid, with 3 diverging, simple stigmas. Capsule 3-lobed, 3-celled, 3-seeded.—Plants smooth, erect, with alternate leaves. Fertile flowers at the base of the sterile spike. Bracts of the spike biglandular at base. May—Sept.

1 S. sylvática L. Herbaceous; stems clustered; leaves subsessile, lance-linear to lance-oblong, and obtuse to acuminate, crenate-serrulate; spikes yellowish, longer than the leaves; glands cup-shaped. ♃ S. 1—3f.

2 S. aquática Chapm. Shrubby; stem single; lvs. short-stalked, lanceolate, acute, sharply serrulate; spikes shorter than the leaves; glands peltate. Fla. 3—6f.

3 S. ligustrìna Mx. Shrubby; leaves lance-ovate, petiolate, entire; stipules ovate; spikes shorter than the leaves; sta. 3. Swamps, S. 6—12f. (Sebastiania, Muller.)

4 S. sebífera L. *Tallow Tree.* Tree 30—40f; lvs. long-petioled, rhomboidal, acuminate, entire; fruit rough, blackish, seeds white. S. §. (Excœcaria, Mul.)

3. TRÀGIA, Plum. Fls. ⚥. Cor. 0. ♂ Calyx 3-parted. Sta. 2 or 3, distinct. ♀ Calyx 5- to 6- to 8-parted, persistent. Style 3-cleft. Stig. 3. Fruit 3-lobed, 3-celled, separating into 3 bivalve, 1-seeded nutlets. ♃ ♄ Homely weeds. Lvs. mostly alternate, pubescent, stipulate. Fls. small, racemed. May—August.

1 T. macrocárpa Willd. Slender summits of the branches twining; lvs. cordate-ovate, acuminate, serrate; rac. long (3—4′); fr. 5—6″. Copses, Ky.. and S. 2—4f.

2 T. urticæfòlia Mx. Erect, hairy, sparingly branched; leaves deltoid-lanceolate, truncate at base, sharp-serrate; fruit very hairy. Dry. S. 1—2f.

3 T. innócua Walt. Erect, branched, puberulent; leaves ovate-oblong, varying to linear, coarsely few-toothed or entire. Dry. S. 1f. (T. urens L., but it does not sting as Linnæus supposed.)

4. JÁTROPHA, L. SPURGE NETTLE. Fls. ⚥, in forked cymes; the fertile generally in the forks. Calyx colored, imbricate in bud. Corolla present or not. Sta. 10—30, monadelphous. Styles 3, forked. Pod 3-carpelled. ♃ Leaves palmi-veined, stipulate.

J. urens, *β. stimulósa* Mul. Low, hispid with bristly stings; leaves half 3-5-lobed, cordate, lobes lanceolate, serrate; sepals white, oval, spreading; corolla 0. Sandy woods, S.: common. Stings white, ½′ long. March—July.

5. ACÁLYPHA, L. THREE-SEEDED MERCURY. Fls. ⚥, in short clusters or little spikes, surrounded by a large cut-toothed bract. Cor. 0. ♂ Calyx 4-parted. Sta. 8—12, monadelphous, with halved anthers. ♀ Calyx 3-parted. Styles 3, each 2- ∞ -cleft. Fr. 3 nutlets. ① Weeds resembling Nettles, with stalked alternate leaves (and ♄ tropical). Summer.

1 A. Virgínica L. Leaves lance-ovate, obtusely pointed, obscurely serrate, equalling their petioles (1—2′); sterile spikes hardly exserted. Dry. 10—20′.

β. graciliénta. Leaves narrower, on shorter stalks; ♂ spikes exserted.

2 **A. Caroliniàna** Walt. Lvs. ovate, cordate, closely and strongly serrate; ♂ spikes axillary, ♀ terminal, fruit soft-echinate, bracts with linear lobes. W. and S.

6. **MERCURIÀLIS**, Tourn. Fls. ⚥, apetalous, axillary, in bractless spikes or fascicles. Calyx 3-parted. Sta. 10—20, anth. 2-celled, extrorse. Fruit 2-carpelled, 2-seeded.—Herbs with opposite, petiolate leaves.

M. ánnua Willd. Lvs. lanceolate, &c., thrice longer than the stalks; branches opposite; ♂ spikes long, interrupted, seeds oval, pitted. ① Waysides, S.: rare. §

7. **RÍCINUS**, Tourn. CASTOR OIL PLANT. Fls. ⚥, apetalous. Calyx 3–5-parted, valvate in the bud. ♂ Sta. ∞, with irregularly united filaments. ♀ Style short, stigmas 3, 2-parted, plumous, colored. Capsule echinate, 3-lobed, 3-celled, 3-seeded.—Herbs or shrubs.

R. COMMŪNIS L.—A stout ① herb with peltate, palmi-lobed leaves, 4—12′, divided into lance-shaped lobes. Southward it becomes a shrub, or tree 10—20f. Cult. for its seeds, yielding the *castor oil*, or for the ornament of its splendid foliage. E. India.

8. **CROTON**, L. Fls. ⚥. Calyx 4–8-parted. Petals hypogynous, 4—8, mostly minute, often (especially in the ♀) wanting. ♂ Disk with 4—6 lobes. Sta. 5 or more, anthers inflexed in the bud. ♀ Ovary 3-celled, styles 3, 1–3-times forked. Fruit 3-carpelled, 3-seeded.—Plants glandular, clothed with scurf or stellate hairs. Leaves alternate.

§ Downy. Fertile calyx 5-parted, with 2 styles, and pendulous..................No. 1
§ Hairy or scaly. Fertile calyx 5-parted, with 3 styles, each 2- or 3-cleft ....Nos. 2—4
§ Densely woolly. Fertile calyx 8-parted. Styles 3, each twice 2-cleft.......Nos. 5, 6

1 **C. monanthógynus** Mx. Stellate-downy, di- and tri-chotomously branched; lvs. ovate or subcordate, silvery beneath; fls. in the forks. ① Prairies, Ill., and S. 1f.

2 **C. glandulòsus** L. Hispid, tri-(or 4-)chotomously branched; lvs. clustered at the forks, lance- to linear-oblong, serrate, with 2 concave glands at base; fls. in clusters, the sterile 4-parted, 8-androus. ① A straggling weed, W. and S. 1—2f.

3 **C. argyránthemus** Mx. Clothed with silvery glandular scales, branched at base; lvs. oval to oblong; fls. in a hd. or spike, silvery all over, all 5-parted. ♃ Ga., Fla. 1f.

4 **C. marítimus** Walt. Half-shrubby, bushy, trichotomously branched, tomentous; lvs. broad-oval, silvery beneath; flowers in dense heads on long stalks; stam. about 10; stigmas 18—20. Drifting sands, sea-coast, S. 2—3f. July—Oct.

5 **C. capitàtus** Mx. Lvs. ovate to oblong, long-petioled, obtuse; ♀ cal. large (7″), 7–8-cleft; styles 3, each 4-parted to base; seed double-convex. W. and S.

6 **C. Ellióttii** Chapmn. Lvs. lance-oblong, short-petiolate, acutish; ♀ cal. 6″ diam., 5–8-cleft; styles 3, each 4-cleft to the middle; seeds plano-convex. ① S. 2—3f.

9. **CROTONÓPSIS**, Mx. Fls. ⚥, minute, in spikes. Calyx 5-parted. ♂ Petals 5, spatulate. Sta. 5, distinct. ♀ Petals 0, 5 scales instead. Stig. 3, each bifid. Ovary and pod 1-celled, 1-seeded. ① Slender, silvery-scurfy, with small, alternate leaves. Upper flowers sterile.

C. lineàris Mx.—Sandy swamps, N. J. to Ill., and S. Stems as slender as Flax, repeatedly trifid and forked, 1—2f. Leaves linear-oblong, 6—10″. June—Sept.

10. **PHYLLÁNTHUS**, L. Flowers ⚥, axillary. Calyx in 5 or 6 segments. Petals 0. Stam. 3, very short. Styles 3, bifid. Ovules and seeds 2 in each 2-valved carpel.—Leaves alternate, in 2 ranks.

P. Carolinénsis Walt. St. slender, with alternate branches; lvs. oval, 6—10″, the ramial much smaller; flowers subsolitary. ① Pa. to Ill., and S. 6—18′. June—Aug.

11. PACHYSÁNDRA, Mx. Flowers 8, apetalous, in bracted spikes. Calyx 4-parted. ♂ Filaments 4, long-exserted, flat. ♀ Styles 3, recurved. Capsule 3-horned, 3-celled, cells 2-seeded. ♃ Procumbent stems from long creeping root-stocks. Leaves alternate.

P. procúmbens Mx. Lvs. ovate to obovate, coarsely toothed, clustered above the spikes, which are all near the base of the stem. Va. to Ky., and S. March—May.

12. BUXUS, L. BOXWOOD. Flowers 8, axillary. ♂ Calyx 3-leaved, petals 2. Sta. 4. ♀ Cal. 4-sepalled. Pet. 3. Sty. 3. Caps. with 3 beaks and 3 cells. Seeds 6. ♭ ♄ Leaves opposite, ovate, entire, smooth.

B. SEMPÉRVIRENS. A tree of slow growth, fine-grained wood, in Europe. The dwarfed varieties are planted in gardens for edgings.

ORDER CXIV. URTICACEÆ. NETTLEWORTS.

Plants of various habit, with stipules (which are often early deciduous) and with small inconspicuous, mostly diclinous flowers. *Calyx* regular, free from the 1-celled ovary. *Stamens* as many as the calyx lobes and opposite to them. *Fruit* a 1-seeded samara, drupe or achenium, separate or aggregated. The following groups have usually been regarded as Orders.

§ ULMACEÆ. *Trees* with colorless innoxious juice. Flowers habitually perfect, not in aments. Fruits separate. No albumen. (Figs. 181, 256, 295, 316, 382, 509)...(*a*)

§§ ARTOCARPEÆ. *Trees* with milky poisonous juice. Flowers diclinous, in aments or heads. Fruits aggregated. Seed albuminous. (Figs. 195–6, 298, 349)...(*b*)

§§§ URTICEÆ. *Herbs.* Flowers diclinous, not in aments. Filaments crenulate. Fertile calyx 3–5-parted. Embryo straight. (Fig. 503)...(*c*)

§§§§ CANNABINEÆ. *Herbs.* Flowers diclinous. Filaments straight. Fertile calyx of 1 sepal, spathe-like. Embryo curved or coiled. (Fig. 213)...(*d*)

a Flowers appearing before the leaves. Fruit a samara winged all around	ULMUS.	1
a Flowers *with* the leaves. Fruit wingless,—*x* a dry nut from a 1-celled ovary	PLANERA.	2
—*x* a sweet, fleshy drupe	CELTIS.	3
b Flowers enclosed within a hollow receptacle, both kinds together	FICUS.	4
b Flowers external.—*y* Fertile aments globular. Branches thorny	MACLURA.	5
—*y* Fertile aments globular. Plants thornless	BROUSSONETIA.	6
—*y* Fertile aments oblong, fruit sweet, juicy	MORUS.	7
c Herbs with stinging hairs.—*z* Stamens 4. Leaves opposite	URTICA.	8
—*z* Stamens 5. Leaves alternate	LAPORTEA.	9
c Herbs stingless.—*n* Stamens 3. Fertile calyx 3-sepalled	PILEA.	10
—*n* Stamens 4.—*o* Flowers in slender spikes	BŒHMERIA.	11
—*o* Flowers in involucrate clusters	PARIETARIA.	12
d Herbs twining. Fruit in an imbricate strobile-like ament	HUMULUS.	13
d Herbs erect. Fruit a 2-valved caryopsis in axillary pairs	CANNABINUM.	14

1. ULMUS, L. ELM. Fls. ☿. Calyx 4–9-cleft. Stam. 4—9, fil. long and slender. Styles 2. Ovary 2-celled. Samara flat, 1-seeded. ♄ Fls. yellowish, or reddish, in precocious clusters. Figs. 181, 256, 295.

* Samara fringed with hairs, hanging on slender ped., 2-beaked	Nos. 1—3
* Samara not fringed, nearly sessile,—*x* slightly notched at apex	Nos. 4, 5
—*x* cleft down to the seed	Nos. 6, 7

1 **U. Americàna** L. *White Elm.* Lvs. oval, acuminate, doubly serrate; flowers in loose, umbel-like clusters; fruit oval, 6″, its 2 beaks with points incurved and meeting. A majestic tree, with ascending branches and often long pendulous "weeping" branchlets. Native, and everywhere cultivated.

2 **U. racemòsa** Thomas. *Cork Elm.* Smaller tree, with rigid branches; branchlets downy, often with wing-like corky ridges; *flowers* 2—4 in each fascicle, which are arranged in racemes. N. H. to Wis., and S. 20—30f.

3 **U. Floridàna** Chapm. Tree 30—40f, with brittle branches, smooth; lvs. thick, acute; fruit orbicular, 2—3″, its teeth broad and erect. W. Fla.

4 **U. alàta** Mx. *Winged Elm. Whahoo.* Tree, with its branchlets here and there winged with 2 corky ridges; leaves lance-oblong, acute, 1—2½′; flowers racemed; fruit downy all over, with its 2 beaks slender. Ill. to Va., and S.

5 **U. fulva** L. *Red Elm. Slippery Elm.* Tree 20—40f; buds covered with fulvous down; leaves oblong-ovate, acuminate; flowers reddish, 7-parted, sessile; fruit orbicular. Low grounds. Valued for its very mucilaginous *liber*.

6 **U.** CAMPÉSTRIS. *English Elm.* A stately tree, 50—70f, with rigid branches and dense foliage; leaves small, ovate; stamens 5; fruit nearly orbicular. Europe.

β. SUBERÒSA. Branchlets with thick corky wings; stamens mostly 4. Europe.

7 **U.** MONTÀNA. *Scotch Elm. Witch Elm.* Large tree, with ample obovate, cuspidate leaves, rough above, downy beneath; flowers 5-parted; fruit oblong, 1′. Europe.

2. **PLÁNERA,** Gmel. Fls. ♂ ☿ ♀. Cal. lobes and sta. 4 or 5. Stig. 2, oblong, diverging; ova. 1-celled, fruit 1-seeded, wingless, indehiscent. ♄

P. aquática Gm. Tree 30—40f, elm-like, with small smooth, ovate, acute, serrate leaves and axillary flowers in clusters of 2—5; not roughened. Swamps, S.

3. **CELTIS,** Tourn. NETTLE TREE. SUGAR-BERRY. Fls. ♂ ☿ ♀, the ♂ 6-parted and the ☿ 5-parted. Sty. 2, elongated, spreading. Drupe globular. ♄ ♄ Leaves mostly oblique at base. Flowers subsolitary. Fig. 316.

1 **C. occidentàlis** L. Tree 30—70f, with wide-spread branches; lvs. ovate, subcordate, acuminate, serrate, rough-hairy beneath; ped. longer than the petiole; sepals triangular-ovate, erect, white; drupe 3″, dark purple. Woods, &c.

β. ***crassifòlia.*** Leaves cordate, thick, mottled with dark and light green.

γ. ***integrifòlia.*** Leaves smooth, subentire; bark smooth. W. and S.

2 **C. pùmila** Ph. A straggling shrub, 3—10f, with broad-ovate, acute, smooth, serrate leaves; calyx of 6 oblong-linear spreading segments, 2″. Woods, S.

4. **FICUS,** Tourn. FIG. BANIAN. Fls. 8, minute, fixed upon the inner surface of a hollow receptacle. ♂ Calyx 3-parted, sta. 3. ♀ Calyx 5-parted, ovary 1, seed 1. Fruit (syconus) composed of the enlarged, fleshy receptacle enclosing the numerous dry, imbedded achenia. Fig. 195.

1 **F.** CÁRICA. *Common Fig.* Leaves cordate, 3-5-lobed, repand-dentate, rough and downy; fig pear-shaped. From Asia. A shrub in our conservatories, a small tree S.

2 **F.** ELÁSTICA. *India-rubber Tree,* in the greenhouse, with a straight, simple trunk, and very large (8—10′), shining, thick, oblong leaves. E. India.

3 **F.** REPENS. Creeping on walls, &c., with ovate, cordate, acute, serrate lvs. E. India.

4 **F.** INDICA, the *Banian* (§ 207), with many trunks, may grow South.

5. **MACLÙRA,** N. OSAGE ORANGE. Flowers ♂ ♀, the ♂ racemous, calyx 4-parted. ♀ Flowers in a dense globular head. Calyx 4-sepalled, fleshy, finally embracing the obconic achenium, all ripening into a globular *sorosis*, resembling an orange. Style terminal. ♄ Juice milky. Leaves alternate, entire. Branches with sharp spines. Fig. 298.

M. aurantìaca. Lvs. shining, ovate-oblong, thickish, pointed; fruit yellow when ripe, lactescent, pendulous. Arkansas. Planted for hedges. May, June.

6. **BROUSSONÈTIA,** L'Her. PAPER MULBERRY. Fls. ♂ ♀, in aments,

the ♂ cylindric, the ♀ globular, style lateral, ovary becoming a fleshy club-shaped 1-seeded fr. protruding from the tubular, 3- or 4-toothed calyx. ♄

B. PAPYRÍFERA. Tree with a low bushy head, of rapid growth, with rough and downy leaves, ovate or variously lobed; fruit dark red, hispid. Japan. Fig. 349.

7. **MORUS**, Tourn. MULBERRY. Fls. ⚥, in aments, the ♂ loose, the ♀ dense and spike-like. Cal. 4-parted, sta. 4, sty. 2. Achenium compressed, enclosed in the fleshy calyx, the whole spike thus constituting a compound berry (sorosis). ♄ Leaves alternate, broad, often palmately lobed. Fig. 196.

1 **M. rubra** L. Tree or shrub, 15—60f; roots yellow; leaves rough and downy, subcordate, serrate; fertile spikes cylindric; fruit dark red, very sweet.

2 **M.** ALBA. *Chinese M.* Shrubs (here), with smooth and shining, cordate, unequally serrate leaves; fruit whitish. Introduced for silkworms.

3 **M.** NIGRA. Tree for ornament and shade, from Persia, with rough, ovate or lobed leaves; fertile spikes oval; fruit reddish-black, acid.

8. **ÚRTICA**, Tourn. NETTLE. Fls. ⚥, sometimes ♂ ♀. ♂ Calyx 4-sepalled. Ovary a cup-shaped rudiment. Sta. 4. ♀ Sepals 4, the outer pair minute, the inner at length surrounding the shining, compressed achenium. Stig. 1, sessile.—Herbs with stinging hairs. Leaves opposite. Fls. green, in axillary or subterminal clusters or racemes. Summer. Fig. 503.

§ Clusters compound, longer than the petioles. Perennials................ Nos. 1, 2
§ Clusters simple, shorter, or not longer than the petioles. Annuals........Nos. 3, 4

1 **U. pròcera** Willd. Stem tall (3—6f), slightly hispid, with few stings; leaves lance-ovate, 5-veined, uncinate-serrate: spikes panicled above. Waste places: common.

2 **U. dioìca** L. St. 1—3f, very hispid and stinging; leaves ovate, deeply serrate, the slender point entire; spikes clustered in the axils. Wastes: common. §

3 **U. urens** L. Low (1f), hairy; lvs. broadly ovate, coarsely serrate, 5-veined; clusters pedunculate, loose, by pairs in each axil. Waste grounds, E. §

4 **U. chamædrioìdes** Ph. St. 1—2f, with scattered bristles; leaves ovate, crenate-serrate; clusters capitate, 1 or 2 in each axil, spiked above. Ky., and S.

9. **LAPÓRTEA**, Gaudich. WOOD NETTLE. Fls. in axillary panicles, the ♂ calyx 5-parted, the ♀ of 4 sepals, the 2 inner larger. Sta. 5. Stig. subulate. Achenium flat, ovate, very oblique. ♃ Hairs stinging. Lvs. ample, ovate, petiolate.

L. Canadénsis Gaud. Leaves 3—5′, acuminate, serrate; flowers minute, green, in panicles, 1—2′, the lower sterile. Damp woods. 2—6f.

10. **PÌLEA**, Lindl. RICHWEED. Fls. in dense axillary clusters, the ♂ with 3 or 4 sep. and sta. ♀ Sepals 3, unequal, oblong. Sta. 3 rudiments. Achenia roughened, erect, ovate. ① Smooth, stingless. Stipules united.

P. pùmila Gray. Stem succulent, weak; leaves rhomb-ovate, crenate-serrate, long-stalked; flowers green, in short clusters. Moist shades. 3—18′. July, Aug.

11. **BŒHMÈRIA**, Jacq. FALSE NETTLE. ♂ Calyx 4-parted, with lanceolate, acute segments. Stamens 4. ♀ Calyx tubular, truncate, or 4-toothed, persistent and closely investing the ovate, pointed achenium.—Herbs or shrubs, stingless. Flowers minute.

B. cylíndrica Willd. Erect, simple; leaves generally opposite, on long petioles,

ovate, acuminate, dentate; upper spikes interrupted, leafy at top, sterile, lower dense, fertile. ♃ A coarse weed in swamps. 2—3f. Spikes 1—6′. July, August.
β. lateriflòra has narrower leaves, shorter stalks, all alternate.

12. **PARIETÀRIA,** Tourn. PELLITORY. Fls. polygamous, in clusters, surrounded by a many-bracted involucre. ♂ Cal. 4-sepalled. Sta. 4, at first incurved, elastically expanding. ♀ Stigma tufted. Ach. polished, enclosed within the persistent, 4-lobed calyx.—Herbs weed-like, with alternate leaves. Clusters of green flowers axillary.

1 **P. Pennsylvánica** Muhl. Lvs. oblong-lanceolate, veiny, tapering to an obtuse point, entire; involucre longer than the flowers. ① Rocky shades. 6—12′.

2 **P. Floridàna** N. Leaves round-ovate, obtuse, entire, on long petioles; flowers as long as the involucre. ① Damp sands, S. 10′. (P. debilis Forst. ?)

13. **HÙMULUS,** L. HOP. Fls. ♂ ♀, the ♂ panicled, with 5 sep. and sta. Anth. with 2 terminal pores. ♀ Aments with large imbricated, entire, 1-flowered bracts. Cal. of 1 sepal, investing the achenium. Styles 2. Embryo coiled. ♄ Twining with the sun. Leaves opposite. Fig. 213.

H. lùpulus L.—Rich alluvion, along streams, and extensively cultivated. Stems 10—20f. Leaves cordate, 3-5-lobed, rough, on long stalks. Bitter, narcotic. July.

14. **CÁNNABIS,** Tourn. HEMP. Flowers ♂ ♀, the ♂ with 5 sep. and sta., in panicles. ♀ In spikes. Cal. a single spathe-like sepal enfolding the 2-valved cariopsis. Embryo curved. ① Leaves opposite, digitate.

C. satìva L.—Fields, waste grounds. Tall, erect, 4—8f. Leaves petiolate, regularly formed of 5—7 lanceolate-serrate leaflets. Cultivated S-W. June. §

ORDER CXV. SAURURACEÆ. SAURURADS.

Herbs with jointed stems, alternate, entire *leaves* furnished with stipules. *Flowers* in spikes, perfect, naked, having neither corolla nor calyx. *Stamens* definite. *Ovaries* 3—5, more or less united. Fig. 15.

SAURÙRUS, L. LIZARD-TAIL. Inflorescence a terminal spike of 1-flowered scales. Sta. 6, 7, 8 or more. Ovaries 4. Berries 4, 1-seeded. ♃ Stem angular. Leaves cordate, acuminate, petiolate.

S. cérnuus Willd.—Common in marshes, 1—2f. Leaves 4—6′. Spikes slender, recurved at the more slender top, its flowers whitish. July, August.

ORDER CXVI. CALLITRICHACEÆ. STARWORTS.

Herbs aquatic, small, with opposite, simple, entire leaves. *Flowers* axillary, solitary, very minute, polygamous, achlamydeous, with 2 colored bracts. *Stamen* 1, rarely 2; *filament* slender; *anther* 1-celled, 2-valved, reniform. *Ovary* 4-celled, 4-lobed; *ovules* solitary. *Styles* 2; *stigmas* simple points. *Fruit* 1-celled, 4-seeded, indehiscent. *Seeds* albuminous.

CALLÍTRICHE, L. Character the same as that of the order. ♒ Very delicate.

* Stems short (6″—2′), spreading on moist grounds. Leaves reniform......Nos. 1, 2
* Stems (3—16′) growing in water. Fruit sessile.—x Leaves of two kinds...Nos. 3, 4
—x Leaves all linear..........No. 5

1 **C. Austínii** Eng. Lvs. obovate, 1—2″; fruit depressed, 4-lobed all around, its pedicel and stig. nearly as long, lobes narrowly winged. N. J. (Porter), N. Y., and W.

2 **C. peploìdes** N. Lvs. elliptical, 1″; fruit roundish, 4-lobed above, *sessile*, its stigmas twice as long, lobes not winged. Tenn. to La. (Hale). 1—2′.

3 **C. verna** L. Floating lvs. 3″, rosulate, obovate, narrowed below, the submersed leaves 6″, oblong-linear; fruit oval, emarginate, longer than its stigmas. Pools.

4 **C. heterophýlla** Ph. Floating leaves spatulate, attenuate below, 4—6″, the submersed linear, 6—9″; fruit globous, obcordate, its stigmas rather longer. Pools.

5 **C. autumnàlis** L. Leaves all submersed, 3—5″, linear, obtuse at both ends; fruit rounded, its lobes slightly united, winged; styles slender. Lakes and rivers.

ORDER CXVII. PODOSTEMIACEÆ. THREADFOOTS.

Herbs aquatic, with the habit of seaweeds, with alternate, dissected *leaves*, with *flowers* minute, perfect, naked or with 3 sepals. *Stamens* 1 or many, hypogynous. *Ovary* compound, 2–3-celled, with as many stigmas, and numerous ovules. *Fruit* a many-seeded capsule, ribbed and somewhat pedicelled. *Albumen* none.

PODOSTÈMUM, L. C. Rich. THREADFOOT. RIVER WEED. Fls. axillary, solitary. Sta. 2, fil. united below. Ovary oblong-ovoid. Stig. 2, sessile, recurved. Caps. 2-celled. Seeds minute.—Small, submersed ♒, adhering to stones and pebbles.

P. ceratophýllum Mx. Leaves alternate, repeatedly forking into linear, thread-form segments; stem a few inches long, in running water: common.

ORDER CXVIII. CERATOPHYLLACEÆ. HORNWORTS.

Herbs aquatic, with whorled, dichotomously dissected leaves. *Flowers* 8, sessile, axillary, minute, with neither calyx nor corolla. *Involucre* 8–12-cleft. *Anthers* (12—24) sessile. *Fertile flower* a simple 1-celled ovary with one ovule. *Cotyledons* 4.

CERATOPHÝLLUM, L. HORNWORT. Character that of the order. ♒

C. demérsum L. Stem floating or prostrate, 8—16′, with numerous branches and whorls; leaf-segment filiform, sharply toothed. Pools.

ORDER CXIX. EMPETRACEÆ. CROWBERRIES.

Heath-like *shrubs*, with evergreen, linear, exstipulate *leaves*, and small, imperfect *flowers*. *Calyx* of 4—6 hypogynous, imbricated scales, the inner often colored and petal-like. *Stamens* 2—4, with compound pollen. *Ovary* free, 2–9-celled, 2–9-ovuled. *Fruit* fleshy, with as many seeds. In Batis the *drupes* are consolidated.

* Stamens 3. Stigmas 6–9-rayed. Berry 6–9-seeded..........................EMPETRUM. 1
* Stamens 3. Stigmas 3 or 4. Style slender. Drupe 3- or 4-seeded.....................COREMA. 2
* Stamens 2. Stigmas 4. Berry 2-seeded. Shrub erect..........................CERATIOLA. 3
* Stamens 4. Stigma 1. Berry 4-seeded. Prostrate..............................BATIS. 4

1. **ÉMPETRUM,** Tourn. CROWBERRY. Fls. ♂ ♀. Perianth consisting of 2 series of scales, the 3 inner petaloid. ♂ Sta. 3, anth. pendulous on long filaments. ♀ Stig. subsessile, 6–9-rayed. Drupe globular, with 6—9 seed-like nutlets. ♄ Alpine.

E. nigrum L. A small prostrate shrub, 1—4f; branches closely beset with oblong-linear leaves with rolled edges, 2—3″; berries black, eatable. High mountains of N. Eng., N. Y. May, June.

2. **CORÈMA**, Don. Perianth of 5 or 6 bractlets, the 3 inner sepaloid. ♂ Sta. 3, exserted. ♀ Ovary 3- or 4-celled. Style filiform, 3- or 4-cleft, with narrow stigmas. Drupe globular, minute, with 3 or 4 seeds. ♄

C. Conradii Torr. Shrublets diffusely branched, 6—12′, with narrowly linear leaves, 2—3″; flowers in terminal clusters, with brownish scales and purple stamens. Sandy barrens, N. J. and N-E., forming blackish tufts. April.

3. **CERATÌOLA**, Mx. SAND-HILL ROSEMARY. Fls. 8, of 6—8 imbricated, concave, fimbriate scales, the 2 or 4 inner membranous. ♂ Sta. 2, exserted, anth. 2-celled, roundish. ♀ Ovary 2-celled. Style short. Stig. 4 or 6, spreading, toothed. Drupe 2-seeded. ♄ Branches whorled, erect.

C. ericoìdes Mx.—Sandy places, Ga., Fla. 3—6f. Leaves whorled, crowded, linear-terete, 5—6″. Flowers reddish, followed by yellowish drupes. March, April.

4. **BATIS**, P. Br. Fls. ♂ ♀, in cone-like spikes. ♂ Calyx of 2 unequal, united sepals. Pet. 4, clawed. Sta. 4, anthers introrse, exserted. ♀ A mass of 4-celled ovaries only, becoming a sorosis of 4-seeded drupes. ♄

B. marítima L.—Salt marshes, Fla. Stems prostrate, 2—3f; leaves club-shaped, fleshy, 1′. Spikes 5″, fleshy. Petals white. June—September.

ORDER CXX. PLATANACEÆ. SYCAMORES.

Trees with a watery juice, alternate, palmate *leaves*, and sheathing, scarious *stipules*. *Flowers* monœcious, in globular aments, destitute of both calyx and corolla. *Sterile.—Stamens* single, with only small scales intermixed. *Anthers* 2-celled, linear. *Fertile.—Ovary* terminated by a thick style with one side stigmatic. *Nut* clavate, tipped with the persistent, recurved style. *Seed* solitary, albuminous. Fig. 288.

PLÁTANUS, L. PLANE TREE. BUTTON WOOD. SYCAMORE. Character of the genus the same as that of the order. The ♂ and ♀ flowers in separate aments.

P. occidentàlis L. Tree in hard, gravelly soil, 50—80f. The trunk grows to great size, and hollow; bark whitish; leaves large, angularly lobed and toothed; stipules oblique; balls pendulous, solitary. May.

ORDER CXXI. JUGLANDACEÆ. WALNUTS.

Trees with alternate, pinnate, exstipulate *leaves* and monœcious *flowers*. *Sterile flowers* in aments, with an irregular perianth. *Fertile*, solitary or clustered. ♀ *Calyx* regular, 3–5-lobed, tube adherent to the partly 2–4-celled ovary. *Fruit* a tryma (§ 157), with a fibrous epicarp (*shuck*) and a bony endocarp (*shell*). *Seed* large, orthotropous, exalbuminous, with lobed, often sinuous, oily cotyledons.

* Sterile aments solitary, simple. Epicarp persistent on the *tryma*..........................Juglans. 1
* Sterile aments clustered, lateral. Epicarp 4-valved and separating........................ ...Carya. 2

1. JUGLANS, L. Walnut. ♂ Fl. a calyx, scale-like, 5- or 6-parted, with about 20 stamens. ♀ Fls. terminal, 4-parted, with 4 greenish petals and 2 fringed stigmas. Tryma with a spongy epicarp closely investing the very rough endocarp. ♄ Leaflets many. Pith in transverse plates.

1 **J. cinèrea** L. *White W. Butternut.* Tree 40—50f, with a large but short trunk, and wide-spread branches; leaflets 15—17, lanceolate; fruit oblong-ovate, viscid-hairy. Good for its fruit and handsome wood. April, May.

2 **J. nigra** L. *Black W.* Tree 60—90f, with a long, straight trunk; leaflets 15—21, lance-ovate, subcordate; fruit globous, glabrous, uneven, the kernel edible. The wood is dark-purple, used in cabinet-work. April, May.

3 **J. règia,** from Persia, but called *English* walnut, has 7—11 leaflets, and a smoothish endocarp (shell) with a rich kernel. Rarely cultivated.

2. CÁRYA, N. Hickory. ♂ Calyx scale-like, 3-parted, with 4—6 stamens. ♀ Calyx 4-cleft, no petals. Stig. 2-lobed, lobes bifid. Epicarp 4-valved, disclosing a smooth, even nut. ♄ Timber very strong. Leaves and both kinds of flowers from same bud, in March—May.

§ Leaflets 13—15, scythe-shaped. Nut oblong, thin-shelled, very sweet.........No. 1
§ Leaflets 7—11. Nut with a tender shell and very bitter kernel.... ....Nos. 2, 3
§ Leaflets 5—9. Nut roundish, hard-shelled, sweet and eatable...(*)
  * Valves of the epicarp distinct to the base. Bark with loose plates....Nos. 4, 5
  * Valves of the epicarp united below. Bark continuous, firm..........Nos. 6—8

1 **C. olivæfórmis** N. *Pecan Nut.* Tree 60—90f; leaflets falcate, 5—6′; ♂ aments separate to base; nut with its kernel loose in the thin, oblong shell. River bottoms, Ind., Ill., and S. Bark at length shaggy.

2 **C. amara** N. *Bitter Nut.* Tree 20—40f; leaflets about 9, ovate-oblong, sharply serrate; fruit roundish, valves half-united; nut white. Moist.

3 **C. aquática** N. Tree 30—40f; leaflets about 11, lanceolate, oblique, subentire; fruit pedunculate, ovate, with a thin, reddish shell. Swamps, S.

4 **C. alba** N. *Shagbark.* Tree 40—50f, with a rough, shaggy bark; leaflets 5, the two lower much smaller; fruit and nut roundish, squarish, with a thin shell and very sweet meat: common. Fruit and timber excellent.

5 **C. sulcàta** N. *Thick-shellbark.* Tree 40—80f, with shaggy bark; leaflets 7 or 9, the odd one subsessile; fruit large, oval, 4-furrowed; nut pointed at each end, 1½—2′ long, with thick shell. Common West.

6 **C. tomentòsa** N. *Mocker Nut.* Tree 40—60f; bark rugged, but not shaggy; leaflets 7—9, odd one stalked, all and the petiole rough-downy; aments hairy; nut with a very thick shell and small kernel.

7 **C. porcìna** N. *Pignut.* Tree 60—100f; leaflets 5 or 7, nearly glabrous; fruit ovate to pyriform, with a bitterish kernel: common. (C. glabra Torr.)

8 **C. microcárpa** N. Tree 60—80f; leaflets 5 or 7, glabrous; aments glabrous; fruit roundish-ovoid, as small as a nutmeg. Woods, N. Y., and S.

Order CXXII. CUPULIFERÆ. Mastworts.

Trees or *shrubs*. *Leaves* alternate, simple, straight-veined, with deciduous stipules. *Flowers* 8, the sterile in aments which are racemed or capitate. ♂ *Calyx* scale-like or regular, with 5—20 stamens inserted at its base. ♀ *Calyx* adherent to the 2–3-celled, 2–6-ovuled ovary. *Fruit* a 1-celled, 1-seeded nut, solitary or several together, invested by an *involucre* which forms a scaly or echinate cupule. *Seed* destitute of albumen, filled by the embryo with its large cotyledons. Figs. 1–4, 182, 256, 277, 218–22, 338–40, 381, 386, 435, 507, 511.

§ Sterile flowers in aments, fertile, solitary, or few together...(*)
  * Involucre of many scales, valveless, cup-like, partly enclosing the 1 nut............QUERCUS. 1
  * Involucre of prickly scales, 4-valved, enclosing 2 or 3 nuts..........................CASTANEA. 2
  * Involucre of soft, prickly scales, 4-valved, enclosing 2 nuts..........................FAGUS. 3
  * Involucre of 2 or 3 large, lacerated, united scales, valveless, with 1—2 nuts..........CORYLUS. 4
§ Sterile flowers and fertile, both kinds in pendulous aments...(*)
  * Involucre scales in pairs, with their edges united, inflated...........................OSTRYA. 5
  * Involucre scales in pairs, distinct, 3-lobed, becoming leaf-like.......................CARPINUS. 6

1. QUERCUS, L. OAK. ♂ Fls. in loose aments. Calyx mostly 5-cleft. Sta. 5—10. ♀ Fls. in clusters or scattered. Ov. 3-celled, 6-ovuled (Fig. 162), with 3 stig., but in fruit a 1-seeded nut (acorn) seated in a scaly cup or involucre. ♄ ♄ A noble genus. In many oaks the fruit is ②, that is, 2 years in ripening, known by its occupying the old wood below the leaves of the season.

§ Leaves mostly entire, the ends subequal, petioles very short...(*)
  * Peduncle longer than the oblong acorn. Leaves evergreen. Fruit ①....No. 1
  * Peduncle shorter than the acorn. Fruit ②.—*x* Lvs. downy beneath...Nos. 2, 3
    —*x* Lvs. smooth both sides...No. 4
§ Leaves 3-lobed and dilated above, *awnless* when mature. Fruit ②........Nos. 5, 6
§ Leaves 3–9-lobed or pinnatifid, broad, lobes *setaceously awned.* Fruit ②...(*)
  * Lvs. at base cuneate, short-pet., 3- or 5-lobed. Shrubs or small trees..Nos. 7—9
  * Leaves at base abrupt or truncate, mostly long-petioled, 7–9-lobed...(*a*)
    a Nut one-third immersed in the saucer-shaped, fine-scaled cup...Nos. 10, 11
    a Nut near half immersed in the hemispherical, coarse-scaled cup...(*b*)
      b Leaves cinereous-downy beneath, acorn also downy.............No. 12
      b Leaves (except when young) glabrous both sides............Nos. 13, 14
§ Lvs. 5–9-lobed, divisions obtuse, never bristle-awned. Fr. ①, sessile...Nos. 15—18
§ Lvs. 9–25-toothed, downy beneath, awnless. Acorn ①, sweet, eatable...Nos. 19, 20

1 **Q. virens** Ait. *Live Oak.* Tree 40—50f, often much smaller, very valuable for timber; leaves small, firm, elliptic-oblong, obtuse, downy and pale beneath, rarely a few sharp teeth; nut oblong-obovoid; ped. 1′. Va., and S.

2 **Q. cinèrea** Ph. *Upland Willow O.* Shrub 4—20f; lvs. as in No. 1, but more downy beneath; nut roundish, in a saucer-shaped cup. Barrens, Va. to Fla.

3 **Q. imbricària** Mx. *Laurel O. Shingle O.* (Fig. 338.) Tree beautiful, 40—50f, with dense dark-green foliage; lvs. 3—5′, lance-oblong, wavy, shining above; nut roundish, in a shallow cup. Common W. and S. Makes poor shingles.

4 **Q. Phellos** L. *Willow O.* Tree 30—60f, with poor timber; lvs. linear-lanceolate, entire, 3—4′, glabrous; acorn roundish, 6″, in a shallow cup. Borders of swamps, N. J. to Ky. and Fla. Young shoots with toothed leaves.

β. ***laurifòlia.*** A large handsome tree; lvs. 3—5′, often with a few teeth. S. †

5 **Q. aquática** Mx. *Water O.* Tree 20—40f, of rounded form and dense, shining foliage; leaves wedge-obovate, entire or obscurely 3-lobed above, attenuate to base, short-petioled; nut round-ovoid. Swamps, Md. to Fla., and cultivated.

6 **Q. nigra** L. *Black-Jack. Barren O. Iron O.* Tree small and gnarled, with dark massy foliage; leaves short-petioled, wedge-form, mostly with 3 subequal rounded lobes at apex, subcordate at base, rust-downy beneath. N. Y., W. and S.

7 **Q. tríloba** Mx. *Downy Black-Jack.* Tree of rapid growth, 20—30f; leaves oblong-cuneiform, acute at base, rusty-tomentous beneath; lobes at apex often toothed, bristle-pointed; nut depressed. Barrens, N. J. to Fla.

8 **Q. Catesbæi** Mx. *Turkey O.* Tree 20—25f; leaves large, very irregular, glabrous, cuneate at base, lobes deep, narrow, with bristle-pointed, divaricate teeth; cup large, half covering the ovoid, mealy nut. Barrens, South.

9 **Q. ilicifòlia** Wang. *Scrub O. Bear O.* Shrub 3—7f, straggling; lvs. *petiolate,* obovate, angularly 5-(3-7-)lobed, 3—4′, whitish-downy beneath; acorn small (5—6″), cup very shallow. Barren tracts: common. Animals feed on the acorns.

β. ***Georgiàna.*** Leaves smaller and smoother, of the same form, on Stone Mt.!

10 **Q. rubra** L. *Red O.* Tree 50—70f, wide and high; leaves long-stalked, glabrous, sinuses rounded, shallow, lobes 7—9, with bristle-pointed teeth; acorn 1′, ellipsoid, ¼ immersed in the shallow cup. Wood reddish, coarse: common.

11 **Q. palústris** Mx. *Pin O.* (Figs. 1-4.) Sinuses deep and broad, lobes oftener 5, petioles long (1—2′), toothed as in Q. rubra; acorns 7—8″; nut ⅓ immersed in the cup. Tree 60—80f, with a light open foliage, in wet, cool soils.

12 **Q. falcàta** L. *Spanish O.* Tree 60—70f; lvs. long-stalked, obtuse at base, ashy-tomentous beneath, lobes 5—7, narrow, simple or toothed, more or less *falcate;* acorn globular, 4—5″, in a shallow subsessile cup. Va. to Fla.

13 **Q. coccínea** Wang. *Scarlet O.* Trees very large (80f); lvs. much like Q. rubra, but changing to *scarlet* in Autumn, while that becomes red-brown; acorn 7—8″, nut ½—⅔ immersed in the cup. In young shoots the leaves almost lose their lobes and teeth, but keep their bristles. Not rare.

β. ***tinctòria.*** *Black O.* Leaves oftener obovate in outline; bark black and bitter.

14 **Q. Leàna** N. *Lea's O.* Leaves oblong, blunt at base, margin with a few angular, very irregular lobes; acorn roundish, in a hemispherical cup. Rare. Ohio (Clark). Ill. (Wolf). A hybrid? but very constant.

15 **Q. alba** L. *White O.* (Fig. 339.) Lvs. short-petioled, acute at base, oblong, sinuate-pinnatifid, lobes subequal, obtuse; acorn sessile; nut oblong-ovoid, ⅓ immersed in the tubercled cup. Timber very useful.

16 **Q. obtusíloba** Mx. *Iron O. Post O.* Tree middle size, wide-spreading; leaves cuneiform at base, downy beneath, deeply sinuate, the 3 upper lobes dilated, each 2-lobed; nut oval, half immersed, sweet. Timber good.

17 **Q. macrocárpa** Mx. *Moss-cup O.* (Figs. 340, 435.) Leaves deeply and lyrately sinuate-lobed (most deeply in the middle); *cup* very deep, *fringed* with the pointed scales, nut ⅔ or more immersed, 1′. Common. W. and S.

18 **Q. lyràta** Walt. *Over-cup O.* Tree large; leaves acute at base, whitish beneath, with 7—9 triangular acute lobes; *cup rugged* with the scales, nearly or quite including the round nut. Swamps, S.

19 **Q. bícolor** Willd. *Swamp White O.* Tree handsome, 70f; leaves obovate, acute and entire at base, white-downy beneath, with 9 or more obtuse teeth or lobes; acorns in pairs on long (1—2′) peduncles. Low woods.

20 **Q. Prìnus** L. *Swamp Chestnut O.* Tree 50—70f, with large (1′) sweet acorns; leaves 4—7′, obovate, crenate-undulate, downy beneath, with straight, strong veins; fruit ped. shorter than the petioles; nut ⅓ immersed. (Q. monticola.)

β. ***acuminàta.*** Leaves oblanceolate, pointed, teeth sharp; fruit subsessile.

γ. ***prinoìdes.*** Shrub 3—4f; fruit crowded, sessile; leaves small.

2. CASTÀNEA, Tourn. CHESTNUT. Sterile flowers in long, slender aments, fertile fls. few, 3 together, in an involucre. Cal. 6-lobed or parted. Sta. 8—20. ♀ Ovary 3-6-celled, with as many stigmas. Fr. a prickly involucre (burr), 4-valved, enclosing 1—3 coriaceous 1-seeded nuts. ♄ ♄ Leaves acuminate, expanding before the flowers. Fig. 381.

1 **C. vesca** L. Tree 50—80f, with a large straight trunk. Lvs. 6—9′ long, lance-oblong,

serrate, smooth; nuts mostly 2 or 3 together; aments 6—9′. yellowish, in July, the brown nuts ripe in October. In woods.

2 **C. pùmila** Mx. *Chinquapin.* Shrub 6—12f, much branched; leaves obovate to oblong-ovate, downy beneath; nut solitary. N. J., W. and S.

3. **FAGUS**, Tourn. Beech. Sterile flowers in capitate aments, suspended by a slender peduncle, fertile 2 within an involucre. Calyx 5- or 6-cleft or lobed. Stam. 5—12. ♀ Ovary 3-celled with 3 stigmas. Fruit a pair of 1-seeded, sharply 3-angled nuts in a prickly involucre. ♄ Leaves plicate in bud. May. Figs. 182, 256, B.

1 **F. ferrugínea** Ait. Tree 50—80f, with a smoothish ash-colored bark; lvs. ovate to oval, short-petioled, pointed, regularly and remotely toothed, hairy when young. Timber fine-grained. Hardly distinct from

2 **F.** SYLVÁTICA, the European Beech, which has broader leaves, and is occasionally cultivated, especially the variety with *purple leaves.*

4. **CÓRYLUS**, Tourn. Hazel-nut. Sterile flowers in a cylindrical ament, fertile flowers in a capitate one. Calyx represented by 2 scales in the axil of a bract. Stam. 8, with half-anthers. ♀ Ovary adherent, 2-ovuled, 2-styled. Nut bony, roundish, 1-seeded, enclosed in a many-cleft involucre. ♄ Leaves acuminate, expanding after the flowers. May.

1 **C. Americàna** Walt. Shrub 5—10f; leaves roundish, cordate; involucre bell-form, much wider than the nut, coarsely toothed. Thickets: common.

2 **C. rostràta** Ait. Shrub 3—6f; leaves ovate to oval; involucre bottle-shaped, longer than the nut, 2-parted, with toothed segments. Thickets.

3 **C.** AVELLÀNA. *Filbert.* Shrub 3—10f; leaves as in No. 1; involucre not larger than the large rounded nut. From Europe, rarely cultivated.

5. **ÓSTRYA**, Michl. Lever-wood. Hop Hornbeam. ♂ Aments cylindrical, hairy. Calyx a scale, with 8 1-celled bearded anthers. ♀ Aments loose, flowers in pairs under each deciduous scale; ovary with 2 stigmas, enclosed in a sac (involucre), which in the *hop-like* fruit is inflated, ovoid, and much larger than the nut. ♄ Wood very hard and strong.

O. Virgínica Willd. Small tree 20—30f; leaves elliptical, acuminate, serrate; buds acute; fertile ament oblong, pendulous, 2′. Woods. April, May.

6. **CARPÌNUS**, L. Hornbeam. Iron-wood. ♂ Aments long, cylindric. Calyx a roundish ciliate scale, with 8—14 stamens, slightly bearded. ♀ Aments loose, with large oblong 3-*lobed bracts*, each 1–3-flowered. Calyx 6-toothed. Stigmas 2. Nut ribbed. ♄ April, May.

C. Americàna L. Tree small, 12—20f; leaves ovate-oblong, acuminate, serrate; bracts of the fertile aments becoming leaf-like, 1′ long. In woods.

ORDER CXXIII. BETULACEÆ. Birchworts.

Trees or *shrubs* with *bark* in thin layers, *leaves* alternate, simple, straight-veined, and with deciduous *stipules*. *Flowers* ☿, 3 together, in the axil of each 3-lobed bract of the ament. *Calyx* 0. ♂ *Stamens* distinct, definite. *Anthers* 2-celled. ♀ *Ovary* 2-celled, 2-ovuled, becoming in fruit a thin, 1-celled, 1-seeded nut. Figs. 163–4, 283, 296, 307, 312, 437.

1. BETULA, Tourn. BIRCH. ♂ Fls. in clustered, drooping, slender aments, bracts peltate, deeply 3-parted. *Calyx a scale*, sta. 4. ♀ Aments oblong-ovoid, bracts 3-lobed, 3-flowered. *Calyx* 0. Ovary tipped with 2 styles. Nut flattened, winged. ♄ ♄ Buds sessile. Flowers yellow, precocious, in Spring. Figs. 163–4, 437.

* Trees with a yellowish bark, smoothish leaves, and short, erect, ♀ aments......No. 1
* Trees with a reddish-brown bark and ovate-oblong, suberect, ♀ aments.....Nos. 2, 3
* Trees with a white bark, long-stalked leaves, and drooping ♀ aments........Nos. 4, 5
* Shrubs with brownish bark, roundish leaves, and short, erect, ♀ aments....Nos. 6, 7

1 **B. lùtea** Mx. *f.* *Yellow B.* A forest tree 40—80f, known at sight by its silver-yellow bark; leaves ovate, deeply and doubly serrate; ♂ aments 2—4′, drooping, the ♀ ovoid-oblong, 1′, erect. Can. to N. Car. (B. excelsa C-B. not of Ait. ?)

2 **B. lenta** L. *Black*, *Sweet*, or *Cherry B.* A noble tree, about 60f; lvs. cordate-oval, acuminate, sharply serrulate; ♂ aments 3—4′, ♀ aments erect, pedunculate, much shorter. Woods, Can. to Ga. Timber rose-colored. Cambium (§ 418) sweet and spicy.

3 **B. nigra** Ait. *Red B.* Tree 30—50f, the bark loose and torn; leaves rhomb-ovate, acute both ends, repand and serrulate, small, petioles hairy; ♂ aments 2—3′, drooping, ♀ oval, *sessile*, erect, 6″. Swamps, Mass. to Fla. Twigs very slender.

4 **B. populifòlia** Ait. *White B.* Tree 30—40f, trunk white, twigs brown; leaves *deltoid* (Fig. 307), lobed and serrulate, acuminate. Thickets, Me. to Pa.

5 **B. papyràcea** Ait. *Paper*, or *Canoe B.* Tree 50—70f, trunk white, branches brown; lvs. ovate, acuminate, doubly serrate; ♀ aments 1′ long. Mt. woods, Can. to Pa.

β. ***minor***. Shrub 6—9f, with smaller and merely *acute* leaves. White Mountains.

6 **B. pùmila** L. *Dwarf B.* Shrub 2—7f, branches (not glandular) and young leaves downy; lvs. rounded to obovate, serrate, 6—16″. Swamps, Ct. to Pa. (Prof. Porter).

7 **B. glandulòsa** Mx. Shrub 1—4f, upright, branches glabrous, *dotted with wart-like glands;* leaves round-obovate, glabrous, crenate, 9″. Mts., N. and N-W.

β. ***rotundifòlia.*** Shrublet prostrate, 6—12′; lvs. orbic. White Mts. (B. nana C-B.)

2. ALNUS, Tourn. ALDER. ♂ Flowers in cylindric, drooping aments, bracts peltate, with 5 scales and several flowers beneath. *Calyx* 4-*parted*, sta. 4, anth. 2-celled. ♀ Aments ovoid, bracts cuneate, truncate, thick, 2-flowered. *Calyx of* 4 *scales*, persistent. ♄ ♄ Buds peduncled.

* Fls. developed before the lvs. in early Spring. Fruit almost wingless.....Nos. 1, 2
* Fls. developed with or after the leaves. Fruit winged, No. 3,.......wingless, No. 4

1 **A. incàna** Willd. *Speckled*, or *Black A.* Stems 8—20f; leaves obtuse at base, broad oval or ovate, sharp-serrate and some lobed, glaucous-downy beneath; stipules lance-oblong. Thickets by streams, N. Eng. to Wis. and Can.

2 **A. serrulàta** Ait. *Smooth A.* Stems in clumps, straightish, 10—15f; lvs. obovate, pointed, doubly serrulate, smooth; stipules elliptical, obtuse. Swamps.

3 **A. víridis** DC. *Mountain A.* Shrub 3—4f; lvs. oval, acute, clammy; stip. broad-ovate; fertile aments on long stalks, oval. Streams in mountains, northward.

4 **A. marítima** Muhl. Tree 20f; leaves glabrous, ovate to obovate, cuneate, serrulate; fertile aments ovoid-oblong, 1′. River banks, Del., and S.

ORDER CXXIV. MYRICACEÆ. GALEWORTS.

Shrubs with alternate, resinous-dotted, often fragrant leaves, with the *flowers* monœcious or diœcious, both kinds in scaly *aments*, and destitute of corolla or calyx. ♂ *Stamens* 2—8. ♀ *Ovary* 1-celled, with 1 erect ovule. *Stig.* filiform. *Fr.* dry or drupaceous, indehiscent. *Seed* with no albumen.

1. MYRÌCA, L. CANDLEBERRY MYRTLE. Fls. ♂ ♀, the ♂ in cylindrical aments; anth. 4—10 in each scale, large, 2-celled. ♀ Aments ovoid, ovary 1 to each bract, in a cup of 3—5 scales, stigmas 1—4, spreading. Drupes covered with wax or resinous dots. ♄ *Leaves undivided.*

* Stigmas 2 or 4. Fruit small (1—3′′), ovoid..............................Nos. 1—3

* Stigma solitary. Fruit large (6′′), oblong. (Leitneria, Chapm.)..............No. 4

1 **M. cerífera** L. *Bayberry.* Shrub 3—4f; lvs. 1—2′, oblong to oblanceolate, entire or a few remote teeth above; stam. about 6; aments 6—9′′; *drupe* oval, 2′′, covered *with white wax* (bayberry tallow). Coasts, Can. to Fla.

β. ***Carolinénsis.*** Lvs. large (3—5′), evergreen, tapering to the petiole. M. and S.

γ. ***pùmila.*** Leaves linear-oblanceolate, acute at each end. 1—3f. S.

2 **M. Gale** L. *Sweet Gale.* Shrub 3—4f; leaves wedge-oblong, obtuse and serrulate at apex, 1—1½′; aments 4—8′′; *nuts crowded*, 1′′, *reddish.* Shores.

3 **M. inodòra** Bartr. Shrub 6—16f, with whitish bark; lvs. thick, evergreen, 1—2′, oblong, obtuse, entire, with rolled edges; *drupe* 3′′, *ovoid*, *black.* Fla.

4 **M. Floridàna** (Chapm.) Shrub 2—6f, with brown bark; lvs. oblanceolate, acute, entire, long-stalked, deciduous; *drupe oblong*, *greenish*, 6′′. Mid. Fla. !

2. COMPTÒNIA, Sol. SWEET FERN. Fls. 8, the ♂ in cylindric aments, with reniform pointed bracts and 3—6 stamens. ♀ Aments globular. Ovary surrounded by 6 linear scales longer than the bracts. Nut ovoid. ♄ *Leaves pinnatifid*, narrow, fern-like, stipulate.

C. asplenifòlia Ait.—Dry hills, Can. to Va. Shrub 2f, with brown twigs, the very fragrant leaves 3—5′ long, with 20—30 wing-like lobes. Stipules pointed.

ORDER CXXV. SALICACEÆ. WILLOW-WORTS.

Trees or *shrubs* with alternate, simple *leaves* and deciduous or persistent *stipules. Flowers* ♂ ♀, both kinds in *aments*, one under each bract of the ament. *Calyx* none or cup-form and entire. *Ovary* 1–2-celled, with 2 short *styles. Fruit* a capsule, 2-valved, ∞-seeded. *Seeds* with a tuft of hairs (coma) and no albumen. Figs. 17–20, 200, 287.

1. SALIX, Tourn. WILLOW. OSIER. Aments cylindric, *bracts* imbricated, *entire*, 1-flowered, no calyx, but a little nectariferous gland instead. ♂ Sta. 2—7. ♀ Ovary ovoid-acuminate, stigmas 2, short. Caps. 1-celled, the valves revolute when open. Seeds ∞. ♄ ♄ ♄ Branches mostly long and slender. Leaves mostly narrow and pointed, and with stipules. Nos. 4, 10, and 21 are used in basket-making.

§ Stamens 3—10. Aments *with* the leaves, scales green-yellow, caducous.....Nos. 1—3

§ Stamens 2, the filaments united. Aments precocious, scales black..............No. 4

§ Stamens 2, rarely 3 (1 in No. 13), the filaments distinct...(*)

* Scales yellow-green. Am. *with* the lvs.—*a* Ov. subsessile, glabrous. Trees....5—7

—*a* Ovaries stalked. Shrubs.....Nos. 8, 9

* Scales of the ♀ aments brownish or blackish, persistent...(*b*)

b Ovaries and pods sessile. Shrubs..............................Nos. 10, 11

b Ovaries and pods stalked, and glabrous. Aments *with* the lvs.....Nos. 12, 13

b Ovaries and pods stalked, and downy or silky...(*c*)

c Aments appearing with the leaves. Shrubs....................Nos. 14—16

c Aments appearing before the subentire hairy leaves...........Nos. 17—19

c Am. before the serrate, smooth or downy long-petioled lvs.....Nos. 20, 21

1 **S. lùcida** Muhl. *Shining W.* Tree small, handsome, 5—15f; branches green; lvs. smooth and shining, lance-ovate, acuminate with a long point; stip. serrate; stam. mostly 5. Along streams, especially northward and northwest. Often cultivated.

2 **S.** PENTÁNDRA. *Bay W.* Tree 20—40f, very elegant, in shrubberies; lvs. lance-ovate, cuspidate-pointed, shining; twigs reddened; aments yellow; sta. 5+. Europe.

3 **S. nigra** Marshall. *Black W.* Shrub 10—20f; leaves linear-lanceolate, attenuate to both ends; stip. small, caducous; branches pale yellow; stamens 3—5. Common.

4 **S. purpùrea** L. Shrub 6—10f, with long, slender, olive-colored twigs; leaves very smooth, oblanceolate; 1 filament with 2 anthers. Low grounds. †

5 **S. frágilis** L. *Crack W. Bedford W.* Trees tall (60—80f), of quick growth, with greenish divergent twigs brittle at base (like many other species); leaves lanceolate; stipules caducous; stamens 2, rarely 3. Often planted in parks. § Europe.

β. ***decipiens.*** A smaller tree, with red polished twigs and upper leaves obovate.

γ. ***Russelliàna,*** has long-pointed, serrate, bright lvs. with conspicuous stipules.

6 **S. alba** L. *White W. Yellow W.* Large trees, with straight branches and yellowish *tough* twigs; lvs. lanceolate with a straight point, and silky-whitish, especially beneath; stigmas subsessile, 2-lobed. Common, of rapid growth. §

β. ***vitellina,*** has shining, yellow branches, with narrower leaves.

γ. ***cærùlea,*** leaves bluish, nearly or quite smooth beneath. By rivers.

7 **S.** BABYLÒNICA L. *Weeping W.* Tree of large size, with long, slender, pendent branches; lvs. linear-lanceolate, acuminate; stipules roundish; ♀ aments 1—2′ long, the ♂ unknown in U. S.—β. ANNULÀRIS, leaves curled into a ring. Not drooping.

8 **S. longifòlia** Muhl. Shrub diffuse, 2—10f, with whitish twigs; lvs. long, linear, pointed both ways, remotely toothed, hairy. River banks, N. Eng., and W.

9 **S. myrtilloìdes** L. Shrub low, erect, glabrous; lvs. elliptic-oblong, entire, acute or obtuse. Mountain bogs, N. and N-W. (S. pedicéllaris Ph.)

10 **S. viminàlis** L. *Basket Osier.* Stems long, straight, slender, 10—12f; lvs. lance-linear, long, pointed, silky-canescent beneath; aments precocious. Wet.

11 **S. herbàcea** L. *Arctic W.* Low, creeping, 1—2′ high; lvs. round-oval, cordate, serrate, glabrous; aments few-flowered, terminal. Summits of White Mountains.

12 **S. cordàta** Muhl. Shrub 6—8f, with smooth, green branches; lvs. lance-oblong, cordate, acuminate, smooth; stipules large, serrate. Wet grounds.

β. ***myricoides.*** Leaves not cordate, with 2 glands at base, glaucous beneath.

γ. ***angustàta.*** Leaves lanceolate, acute at base; stipules much smaller.

13 **S. Cútleri** Tuckm. Low, prostrate; lvs. elliptic to obovate, shining above; stamen single; aments pedunculate, dense. White Mountains. (S. uva-ursi C-B.)

14 **S. vagans,** β. ***rostràta*** (Andersson). Shrub 3—12f, with straight, erect, yellowish branches; leaves lance-ovate to lance-obovate, acute, subentire, glaucous-downy beneath; stip. toothed; fertile aments becoming long and loose; ovaries long-pointed (*rostrate*). Dry grounds, Penn., N. and W. (S. livida Wahl.)

15 **S. argyrocárpa** And. Shrub low, creeping; leaves lance-oblong or -linear, glaucous beneath with appressed silvery hairs; pod short-conical, silvery-silky, style slender. White Mountains. Young plants all silvery. (S. repens C-B.)

16 **S. chlorophýlla** And. Shrub low, spreading; lvs. glabrous, glaucous beneath; lanceolate to oblanceolate, subentire; fruit very short-stalked; style very long, stigma entire; stipules 0. White Mountains, and N. (S. phylicifolia C-B.)

17 **S. tristis** Ait. *Sage W.* Small downy shrub with a profusion of small naked aments; leaves lance-linear to oblanceolate; stipules minute, caducous. Dry fields.

18 **S. hùmilis** Marsh. Shrub 4—8f, with brown twigs; lvs. oblanceolate; stip. lunate, subdentate, shorter than the distinct petioles. Dry. (S. Muhlenberghiana Barr.)

19 **S. cándida** Willd. Shrub 4—6f, handsome, all whitish; leaves linear-lanceolate, very long; stipules lanceolate, as long as the petioles. In damp woods. Common.

20 **S. díscolor** Muhl. Shrub 7—15f; branches greenish-brown; leaves lance-oblong, remotely toothed, glaucous beneath; stipules lunate, toothed or entire; ov. conical, densely silky; *stigmas long, linear.* Swamps. (S. eriocephalus Mx.)

21 **S. petiolàris** Sm. Shrub 4—15f, twigs long, slender, tough, purplish or yellowish; lvs. linear-lanceolate, smooth, glaucous beneath; stipules lunate, dentate; ovaries ovoid, densely silky, *stigmas very short.* Sandy banks of streams.

β. ***sericea.*** Lvs. grayish-silky beneath; stigma sessile; stipules deciduous.

2. **PÓPULUS,** Tourn. POPLAR. ASPEN. Aments cylindric, scales lacerate-fringed. Cal. an oblique, disk-like cup, its margin entire. ♂ Sta. 8—30. ♀ Ova. free, stig. very large, 2-lobed. Caps. 2-valved, 2-celled. ♄ Large trees, with soft, light wood. Leaves broad, on long, often compressed petioles. Aments lateral, before the leaves.

§ Buds not viscid. Leaves lobed, always white-downy beneath..................No. 1
§ Buds not viscid. Leaves round-ovate, soon glabrous and green............Nos. 2—4
§ Buds viscid with a resinous varnish. Leaves always glabrous...(*x*)
x Leaves ovate, whitened beneath. Stamens 20—30 ....Nos. 5, 6
x Leaves deltoid or deltoid-ovate. Stam. 6—30. Petioles compressed..Nos. 7—9

1 **P.** ALBA. *Abele P. Silver-leaf P.* Tree rapidly growing, and spreading by the roots; leaves cordate, lobed, dark green above, very white beneath. Europe.

2 **P. tremuloìdes** Mx. *American Aspen.* Tree 25—40f; bark smooth, greenish; lvs. roundish-cordate, abruptly pointed, dent-serrate; petioles compressed, rendering the leaves *tremulous* in the slightest breeze. Woods: common.

3 **P. heterophýlla** L. *Cotton-wood.* Tree 40—60f, with smooth greenish bark; lvs. roundish, cordate or ovate, serrate, white-downy when young; buds very downy, short, obtuse; stamens very many; seed with much *cotton.* Wet woods.

4 **P. grandidentàta** Mx. Tree some 40f, with smoothish gray bark; lvs. round-ovate, acute, with large unequal sinuate teeth, villous when young; buds subpubescent; petioles compressed. Woods. Common northward.

5 **P. balsamífera** L. *Balsam P. Tacmehac.* Tree 40—80f, with rough bark; lvs. ovate, acuminate, with appressed serratures; buds very fragrant. Wet. N.

6 **P. cándicans** Ait. *Balm-of-Gilead.* Tree 30—50f; lvs. ovate, cordate, acuminate, serrate; petiole hairy; buds full of fragrant resin. Woods, and cultivated.

7 **P. angulàta** Ait. *Western Cotton-wood.* Tree 40—80f, branches acutely angular or winged; leaves deltoid-ovate, or broad-cordate; buds little viscid. S. and W.

8 **P. Canadénsis** Desf. *Necklace Cotton-wood.* Tree 40—80f; young branchlets angular; lvs. deltoid to oval, acuminate, erose-denticulate, subcordate; ament scales not hairy. By rivers and lakes, N. and W. (P. monilifera Ait.)

9 **P. nigra,** β. ***betulifòlia.*** *Black P.* Tree with an ovoid form, 30—40f; young branches and lvs. pubes.; lvs. deltoid-rhombic, pointed, crenate-serrate. N. Y.: rare. †

γ. ***dilatàta.*** *Lombardy P.* Tree very tall, pyramidal in form; lvs. deltoid. Com.

CLASS II. GYMNOSPERMÆ.

Pistils none, or represented by open scales, with ovules in their axils. Stigma none, but the pollen applied directly to the ovules, which become naked seeds, destitute of a true pericarp. Flowers always diclinous. Cotyledons often more than 2. (§ 510.)

COHORT 4. CONOIDEÆ. Equivalent to the Class. (§ 515.)

ORDER CXXVI. CYCADACEÆ. CYCADS.

Trees of low stature, simple trunks with their internodes undeveloped and the surface scarred with the fallen leaves. *Leaves* pinnate, parallel-veined, circinnate. *Flowers* diœcious, naked, in cones, ♂ *anther* covering the under surface of the connectile. ♀ *Scales* peltate, bearing naked ovules dorsal or marginal.

1. **CYCAS** REVOLÙTA, from Japan, hardy South, has a short thick trunk, crowned with numerous pinnate leaves, 4—5f long, with innumerable linear 1-veined leaflets rolled at the edges. Fruit in an oblong spadix.

2. **ZÀMIA** INTEGRIFÔLIA. COONTIE. FLORIDA ARROW-ROOT. Stem corm-like, abounding in starch. Leaves 3—5f long, leaflets 3—5′, lance-oblong, *jointed* to the rachis, entire, ∞-veined; fruit in a large oblong cone. S. Fla.

ORDER CXXVII. CONIFERÆ. CONIFERS.

Trees or *shrubs* mostly evergreen, abounding with a resinous juice. *Leaves* scattered or fascicled, mostly linear, parallel or fork-veined. *Flowers* ♂ ♀ or ☿, destitute of corolla or calyx, in aments and cones. ♂ *Stamen* 1, or several united. ♀ *Ovary*, *style*, and *stigma* wanting. *Ovules* 1—∞ at the base of the carpellary scale. *Fruit* a strobile (cone) with the scales woody and distinct, or baccate with the scales fleshy and coherent. Figs. 107, 166, 194, 216, 256, 293, 299, 352–3, 473–4, 491. See Hoopes' *Book of Evergreens.*

§ ABIETINEÆ. Scales of the cone each with a bract beneath it. Seeds 2, winged...(*)
§§ CUPRESSINEÆ. Scales bractless. Seeds 1—9, mostly with 2 wings...(**)
* Leaves evergreen, linear, 2—5 together in each fascicle ....PINUS. 1
* Leaves evergreen, linear, solitary, scattered..............................ABIES. 2
* Leaves in fascicles of many together,—*a* evergreen.......................CEDRUS. 3
—*a* deciduous.............................LARIX. 4
** Cones baccate, consisting of the fleshy coherent scales....................JUNIPERUS. 5
** Cones dry, scales imbricated.—*x* Leaves lance-linear.....................CUNNINGHAMIA. 6
—*x* Leaves scale-form, opposite, 4-rowed.....THUYA. 7
** Cones dry, scales valvately closed.—*y* Lvs. scale-form, opposite, 4-rowed...CUPRESSUS. 8
—*y* Lvs. linear, alternate, deciduous....TAXODIUM. 9
—*y* Lvs. alternate, evergreen. †........SEQUOYA. 10

1. **PINUS,** L. PINE. Fls. ☿, the ♂ in clustered aments. Stamen 1, with a 2-celled anther. ♀ Aments of many open imbricated carpellary scales, each with a bract at the back and 2 inverted ovules at base within. Cone woody, persistent two years, the scales often thickened and awned at the tip. Seeds nut-like, winged. Cotyledons 3—12. ♄ Fascicles of 2—5 linear-filiform leaves, sheathed at base.

§ Leaves in 5's.—*x* Scales spineless, hardly thickened at end................Nos. 1—3
—*x* Scales ending with a cap and a spine..........................No. 4
§ Leaves in 3's.—*y* Cones oblong, with small recurved spines................Nos. 5, 6
—*y* Cones ovoid, with weak or strong spines................Nos. 7—9
§ Leaves in 2's.—*z* Scales tipped with spines or prickles................Nos. 10—12
—*z* Scales spineless.—*a* Trees native........................Nos. 13, 14
—*a* Trees European...................Nos. 15, 16

1 P. strobus L. *White Pine.* A majestic tree, 100—170f, in the forests; lvs. needle-shaped, 4—5′, not rigid; cones oblong, 5—7′, pendulous. Woods, Penn., N. and N-W. Timber of great value in architecture.

2 P. EXCÉLSA. *Bhotan P.* Lvs. glaucous, 5—7′; cones cylindric, 6—9′; nuts winged. Asia.

3 **P.** CEMBRA. *Stone P.* Leaves 2—3'; cones ovate, erect; seeds hard, wingless. Alps.

4 **P.** ARISTÀTA. *Colorado P.* Leaves 1—1½', crowded; cones oval, 2½'. Tree 40—50f.

5 **P. austràlis** Mx. *Long-leaved P.* Tree 60—100f, very resinous; leaves 10—15', crowded; cones lance-oblong, nearly as long as the leaves. Stands in extensive forests, South. Very valuable for turpentine, timber, or fuel.

6 **P. Tæda** L. *Loblolly P.* Tree 50—90f; leaves 6—10', with long sheaths; cones deflexed, half as long as the leaves, with small but strong spines. S.

7 **P. seròtina** Mx. *Pond P.* Tree 30—50f; leaves 5—8', rigid; cones broadly ovoid, polished, nearly spineless, as large as a goose-egg. Wet lands, S.

8 **P. rígida** Mill. *Pitch P.* Tree 30—70f, with very rough bark; leaves *rigid*, 4—6', with short sheaths; cones clustered, ovoid-conic, 2—3'. Sandy barrens.

9 **P.** PONDERÒSA. Tree 50—100f in California, with sturdy trunk, smoothish bark, heavy wood; leaves 9—12'; cones 3½', conical, with short strong spines.

10 **P. mitis** Mx. *Yellow P. Spruce P.* Tree of slow growth, 30—60f; lvs. covering the branchlets, some of them in 3's, mostly in pairs, 3—5', slender; cones 1⅓—2', ovoid-conic, clustered. In dry lands. Timber very valuable.

11 **P. pungens** Mx. Tree with crooked branches, 20—30f; leaves stout, crowded, about 2'; cones ovoid, 3', with stout spines 3'' long. Mountains, Penn., and S.

12 **P. inops** Ait. *Jersey P. Scrub P.* Tree 15—25f, rough and crooked; lvs. rigid, obtuse, 2—3'; cones ovoid-oblong, 2—3', with straightish prickles. Barrens.

13 **P. resinòsa** Ait. *Norway P. Red P.* Tree 60f, bark smoothish; lvs. slender, 5—6', sheaths 6–12''; cones conic with a rounded base, half as long as the leaves. Dry woods, Penn. to Wis., and N. Timber compact, moderately resinous.

14 **P. Hudsònica** Poir. (P. Banksiana Lamb.) A straggling pine 5—25f; lvs. rigid, curved, 1', the cones longer (1⅓—2'), recurved, smooth. Rocks, Me., W. and N.

15 **P.** LÁRICO. *Corsican Pine.* A large tree of rapid growth, very handsome in parks; leaves slender, bright green, wavy, 4—6'; cones 2—3'. Branches whorled.

β. AUSTRÌACA. *Austrian P.* Leaves more rigid, of a rich dark-green color.

16 **P.** SYLVÉSTRIS. *Scotch P.* Tree of rapid growth, perfectly hardy; lvs. 2—4', twisted, rigid, bluish green; cones ovoid-conic, 2—3'. Common in Europe.

2. ÁBIES, Tourn. SPRUCE. FIR. HEMLOCK. ♂ Aments clustered with the old lvs. ♀ Am. solitary, cones with thin, flat, spineless scales, persistent one year. Seeds winged. Cotyledons 3—9. ♄ Lvs. solitary, not sheathed, scattered over the branches, linear, short, mostly petioled.

§ *Fir.* Cones erect, the scales deciduous. Lvs. flat, spreading two ways...(*x*)
§ *Spruce.* Cones nodding. Lvs. 4-sided or ensiform, pointing all around...(*a*)
§ *Hemlock.* Cones hanging. Leaves flat, mostly spreading two ways.........Nos. 1—3
  a Cones oval, 1—2' long, the scales nearly entire. Native. †..............Nos. 4, 5
  a Cones oblong, 3—8' long, the scales erose-dentate. Cultivated..........Nos. 6, 7
    x Bracts conspicuously exserted, much longer than the scales........Nos. 8—10
    x Bracts shorter than the scales or rarely a little exserted...........Nos. 11—13

1 **A. Canadénsis** Mx. *Common H.* Tree 50—80f, very beautiful when young; lvs. short-linear (6—8''), glaucous beneath; cones ovoid, terminal, as long as the leaves, scales concealing the bracts. Rocky woods: common N.

2 **A.** WILLIAMSÒNII (or Pattoniana). Large tree in Oregon, very fine and hardy here, but rare; leaves yellowish, 6—8'', the cones three times longer, bracts concealed.

3 **A.** DOUGLÁSSII. A huge tree in Oregon, handsome; cones with long, 3-forked bracts.

4 **A. nigra** Mx. *Double S.* Tree pyramidal, 60—80f; leaves 6—7'', dark green; cones ovoid, 1—2, scales erose-denticulate. Damp mountain woods, northward.

5 **A. alba** Mx. *Single S.* Tree 30—80f, subpyramidal; leaves 6—9'', glaucous; cones deciduous, cylindrical, 2', with the scales entire. Rocky woods: common.

6 **A.** PÌCEA (or excelsa). *Norway S.* A stately tree with dense dark-green foliage; lvs. 9—12''; cones 5—8' long, light brown, scales notched. Very common.

7 A. Menzièsii. Tree 50—70f in Oregon; lvs. ¾′, silvery-glaucous; cones 3—4′, many.

8 A. bracteàta. Tree 100f in California; leaves 2—3′, silvery-glaucous beneath; cones 4′, bracts 3-lobed, middle lobe much exceeding the scale, and recurved.

9 A. pectinàta. Tree from Europe, 80f; leaves 9″, obtuse, glaucous beneath; cones 1—7′, brown when ripe, bracts fringed, the cuspidate point spreading.
  β. Cephalónica, from Greece, bracts linear-oblong, toothed, reflexed.
  γ. Nordmánnia, from Crimea, bracts with an entire recurved point.

10 A. Fràseri Ph. *Double Balsam F.* Tree small (15—30f); bark smooth, *blistered* as in the next; leaves 8—10″, seeming 3-veined beneath; cones 1—2′, oblong; bracts denticulate, long-pointed, reflexed. White Mountains! and Alleghanies.

11 A. balsàmea Marsh. *Balsam F.* Tree 30—50f, with smooth bark filled with *blisters* (reservoirs) of *balsam;* leaves 8—10″, obtuse, silvery beneath; cones cylindrical, 3—4′ × 1′, bracts concealed or slightly exserted. Damp woods. Cultivated.

12 A. Sibírica (or Pichta). Small tree from Asia; leaves 1′; cones ovoid-conic, 3—4′.

13 A. grandis. Tree 200f in Oreg.; lvs. 1′—18″, bifid, silvery beneath; cones oblong, 4′.

3. **CÈDRUS,** Link. ♂ Am. solitary, terminal. ♀ Cones persistent two or three years; scales persistent, close-pressed; bracts concealed adnate to the scales. ♄ Leaves sessile, fascicled as in Larix, rigid, evergreen.

1 C. Libàni. *Cedar of Lebanon.* Tree with wide-spread branches; leaves 9—15″, dark green, acute; cones oval, obtuse, brown, 3 × 2′, scales very many.

2 C. Deódara. Huge tree in the Himalayas; lvs. 1—2′, light glaucous; cones ovoid, 4′.

4. **LARIX,** Tourn. Larch. Tamarack. ♂ Anthers 2-celled, cells opening lengthwise, with simple pollen grains. ♀ Cones erect, oval or roundish, scales colored, persistent. Seeds with a proper wing. ♄ Leaves deciduous, acerous, soft, scattered, and in axillary, many-leaved fascicles.

1 L. Americàna Mx. A splendid tree 70—100f, with straight axis and horizontal branches; leaves filiform, very slender, 1—2′, in bunches of 12—20; cones deep purple, 6—10″, scales few, with inflexed edges. Woods northward. Common in cult.
  β. ***péndula.*** Branchlets slender and drooping. Exquisitely beautiful.

2 L. Europæa. Large tree; lvs. flattened, linear-spatulate; cones 1—1½′ long.

5. **JUNÍPERUS,** L. Juniper. Fls. ♂ ♀, aments very small, roundish. ♂ Scales peltate, each with 4—7 anther-cells beneath. ♀ Scales few, united at base, 1–2-ovuled, forming a sort of berry in fruit. Cotyledons 2. ♄ ♄ Leaves subulate or scale-like, pungent, opposite or whorled.

§ Lvs. scale-form, opp., 4-rowed, and subulate in 3's, not jointed, nerveless...Nos. 1—3
§ Lvs. all subulate and in 3's, divaricate, jointed to the stem, 1-nerved .....Nos. 4—7

1 J. Virginiàna L. *Red Cedar.* Tree of middle size, dark green; early lvs. very slender, 3—4″, little divergent, in 3's, later ones 1—2″, scale-form, 4-rowed, opposite, appressed; cones or berries small, blue-white, on short branchlets. Rocky soils.

2 J. sabìna, β. ***procúmbens*** Ph. Shrub trailing; lvs. opposite, obtuse, a gland in the middle, imbricated in 4 rows; fruit larger (3″), nodding, dark purple. Rocks, N.

3 J. Bermudiàna L. Late branchlets very slender, covered with scale-form. pungent lvs. in 4 rows, divergent, 1″; fr. brown, no bloom, 2″, subsessile. Fla. 15—20f.

4 J. commùnis L. *Common J.* (Fig. 353.) Tree or shrub; leaves in 3's, crowded, pungent-acuminate, 6-8″, fruit small (2″), subsessile, dark-purple, sweetish. Woods.
  β. ***alpina.*** Shrub trailing; leaves more crowded, less spreading, curved. N.
  γ. oblónga. Branchlets drooping; leaves lance-linear, glaucous; fruit clustered.

5 J. rígida. *Weeping J.* Branchlets drooping; lvs. channelled on the upper side. Japan.

6 J. Oxycèdrus. Shrub 10-12f, from Eur., is known by its red-brown berries 3-4″ long.

7 J. drupacea. Shrub from Syria, 8—12f, with berries dark-purple, as large as a plum.

6. **CUNNINGHÀMIA** SINÉNSIS. Tree from China, 30—40f, very unique. Leaves 1—1⅔′, lance-linear, stiff and pungent, in 2 rows. Cones ovoid, 1½′, with toothed and pointed scales (or bracts ?) each 3-seeded.

7. **THÚYA**, Tourn. ARBOR VITÆ. Fls. 8, on different branches, terminal. ♂ Anther-cells 4 on each imbricated scale. ♀ Scales few, in pairs, opposite, imbricated, each 2–6-ovuled. Seeds winged. ♄ ♄ Leaves scale-form, opposite, imbricated in 4 rows.

1 **T. occidentàlis** L. Tree branched from base to summit; leaves rhombic-ovate, tubercled on the back; cones oblong, scales not reflexed, each 2-seeded. On rocky banks, common N., now very frequent in cultivation. Many varieties.

2 **T.** (THUYOPSIS) DOLABRÀTA. Tree from Japan, 40—60f, with ovate scale-form lvs., not appressed; cones small, roundish, each scale 5-seeded. Rare.

3 **T.** (BIOTA) ORIENTÀLIS. Shrub light green, or yellowish; ramifications vertical; cones broad, with thick scales and horn-like reflexed points. China.

8. **CUPRÉSSUS,** Tourn. Aments 8, small, roundish. ♀ Scales each with 2—∞ erect ovules. Cone globular, the scales angular, peltate, valvately closed until ripe. ♄ Leaves scale-form, flat, imbricated as in Thuya, often with a tubercle on the back. CYPRESS.

1 **C.** SEMPÉRVIRENS. Cone large, oval, 1′, scales ∞-seeded; lvs. minute, ovate, obtuse, very closely imbricated. Cultivated South. Tree strict, conical, 20—40f.

2 **C. thyoìdes** L. *White Cedar.* Tree pyramidal, filiform branchlets square; leaves minute, lance-ovate, close, the tubercle manifest. Swamps. Cones small as peas.

3 **C.** LAWSÒNII. Splendid tree from Oregon; branchlets flattened, feather-like, bluish-green; leaves lance-ovate, tubercled; cones 1½″. Becoming common.

9. **TAXÒDIUM,** Rich. BALD CYPRESS. Fls. 8, sessile, small, roundish, the ♂ in spikes, ♀ in pairs below. Cone globular, the scales peltate, angular, thick, firmly closed till ripe, with 2 angular seeds at base. Cotyledons 6—9. ♄ With deciduous, linear, 2-rowed leaves.

T. dístichum Rich. Tree 100—125f, trunk 6—9f diam.; large conical excrescences grow up from the roots; lvs. light-green, scattered, in 2 rows on the slender branchlets. Swamps, Va., and S. Timber valuable.

10. **SEQUÓYA,** Endl. RED-WOOD. Cones roundish, with peltate trapezoid, 5-seeded scales, valvately closed. Seeds winged both sides. ♄ Immense, Californian. Leaves linear or subulate, alternate.

1 **S.** SEMPÉRVIRENS, Tree 200f, with a diam. of 10f; bark blackish, with rose-purple wood almost imperishable; cones globular, 1′; leaves of 2 kinds.

2 **S.** GIGÁNTEA. Tree 300f, with a diam. of 20f (often larger !); bark cinnamon color, wood dull red; cones oval, near 2′; leaves mostly subulate. Rarely planted.

ORDER CXXVIII. TAXACEÆ. YEWS.

Trees or *shrubs*, with the general habit of the Pines, but with no cones, nor even the carpellary scale. *Flowers* consisting simply of anthers or an ovule involucrate with bracts. *Fruit* a nut-like seed, naked, or in a cup-form dry or pulpy disk. *Cotyledons* 2. Fig. 166.

* Leaves linear. Anthers 5—8 on each scale. Seed sitting in a fleshy cup..............TAXUS. 1
* Leaves lance-linear. Anthers 4. Seed fleshy-coated or dry, not in a cup............TORREYA. 2
* Leaves linear to ovate, 1-veined. Anthers 2. Seed inverted, in a shallow cup........PODOCARPUS. 3
* Leaves flabelliform, fork-veined. Anthers 2. Seed erect, in a deep cup....... ......SALISBURIA. 4

1. TAXUS, Tourn. YEW. Flowers axillary, the ♂ in aments. Stam. or bracts peltate, 5–8-lobed, with 5—8 anther-cells. ♀ Flower solitary. Ovule erect, becoming a nut-like seed, sitting in a deep fleshy cup-shaped disk. ♄ ♄ Leaves rigid, alternate, in 2 rows.

1 **T. Canadénsis** L. *Dwarf Y.* (Fig. 166.) Shrub low or prostrate, branches ascending; lvs. mucronate, revolute-edged, 9—12″; stam. with 5 anther-cells; fruit depressed-globous, a black seed in an amber-colored cup. Rocky soils, northward.

2 **T.** BACCÀTA. *English Y.* Tree of low stature, widely spreading; lvs. falcate, acute, flat, 10—12″; stam. with 6—8 anther-cells; fruit oblong-bell-form. Europe.

3 **T. brevifòlia** N. Tree 15—50f, branches ascending; lvs. 7—10″, very narrow; sta. with 6 anther-cells; fruit oval. Fla.? and Oreg. The species are all closely related.

2. TORRÈYA, Arn. Flowers axillary, the ♂ many in the ament, bracts in 4 rows. Stamens with 4 anther-cells. ♀ Ovule with few bracts, becoming drupe-like, at length a dry ovoid bony nut or seed. ♄ ♄ Leaves rigid, alternate, 2-rowed, pungent, lance-linear.

T. taxifòlia Arn. Tree 15—30f, with erect strict form, dark green; lvs. 1—1½′ long, 2-ranked as well as the branchlets; fruit smooth, glaucous, ovoid, 9—11″. Fla. †

3. PODOCÁRPUS, L'Her., contains some rare evergreens with remarkably large leaves (2—3′ long). As yet very sparingly cultivated.

4. SALISBÙRIA ADIANTIFÒLIA (or Ginkgo biloba). Tree 40—80f, from Japan, strict and pyramidal. Lvs. fan-shaped, 2-lobed, fork-veined and petiolate, in structure much like the Maidenhair Fern. The flowers and fruit are seldom seen.

PROVINCE, ENDOGENS,

THE MONOCOTYLEDONOUS PLANTS. Stems without the distinction of bark, wood, and pith, endogenous in growth (§ 421). Leaves mostly parallel-veined and alternate. Flowers 3-parted (rarely ^{4}/). Embryo with one cotyledon. (

CLASS III. PETALIFERÆ.

Endogenous plants having flowers either with a whorled perianth or without one, but *never glumaceous*. (Class IV. GLUMIFERÆ. Page 355.)

COHORT 5. SPADICIFLORÆ.

Flowers crowded on a thickened or club-shaped rachis (spadix), mostly naked, rarely with a scale-like perianth. (Cohort 6, p. 322.)

ORDER CXXIX. PALMACEÆ. PALMS.

Trees or *shrubs*, chiefly with unbranched trunks growing by the terminal bud. *Leaves* large, plaited, on sheathing petioles, collected in one terminal cluster. *Flowers* perfect or polygamous, on a branching spadix bursting from a spathe. *Perianth* double, 3-merous, hexandrous, *ovaries* (and *styles*) 3, distinct or commonly united into 1, each 1-ovuled. *Fruit* fleshy, 1–3-seeded. Fig. 508.

* Flowers all perfect. Ovaries and styles united into 1. Berry single................SABAL. 1
* Flowers perfect and staminate. Ovaries and styles distinct. Drupes 3..............CHAMÆROPS. 2

1. SABAL, Adans. PALMETTO. Fls. ☿, sessile, complete. Sepals 3, united, petals 3, subdistinct. Sta. 6, fil. distinct. Ovaries 3, soon united, Sty. 1. Fr. a dryish 3-seeded berry. ♄ ♄ Caudex (§ 227) procumbent or erect, beset with the persistent bases of the petioles. Lvs. palmately fan-shaped, many-cleft. Flowers small, greenish. June—Aug.

1 **S. Palmétto** Loddig. Caudex erect, 20—50f, usually enlarged above; the majestic lvs. are 6—10f long, all from one terminal bud; spadix much shorter than the leaves, spathe double; berry globular. Along the coast, Fla. to S. C.

2 **S. Adansòni** Guern. Caudex prostrate; lvs. rigid, longer than the *even*-edged petioles; spadix slender, much branched, as high (3—4f) as the leaves; style thick, obtuse; berry depressed. Along the coast, in low grounds, S.

3 **S. serrulàta** R. & S. Caudex creeping; petioles *aculeate-serrate;* spadix thick, 2—3f; style subulate; berry oblong-ovoid. Barrens, S. C. to Fla.
β. ***minima.*** Every way smaller; leaves about 7-cleft. E. Fla.

2. CHAMǼROPS, L. BLUE PALMETTO. Fls. ☿ and ♂. Perianth as in Sabal. Sta. 6 or 9, connate at base. Ovaries 3, distinct, stig. sessile. Berries 3, 1-seeded. Palms acaulescent. Petioles aculeate. Spadix dense-flowered, flowers yellowish. June—Aug.

C. Hystrix Fraser. Caudex low, making offsets at base; leaves 3—4f, the petioles spiny in the axils; drupes ovoid, hairy, in masses. Clay soils, Ga., Fla.

ORDER CXXX. ARACEÆ. AROIDS.

Herbs with a creeping rhizome or corm, an acrid or pungent juice, *leaves* often veiny, and the *flowers* mostly diclinous and naked. *Inflorescence* a spadix, dense-flowered, naked or mostly surrounded with a large spathe. *Perianth* none, or of 4—6 scales. *Anthers* extrorse. *Ovary* free, *stigma* sessile. *Fruit* baccate or dry, *seeds* albuminous. Figs. 432, 436.

* House, or greenhouse plants, usually with very large leaves...(*y*)
* Wild native plants, growing in water or damp places...(*a*)
  a Spadix growing to the spathe. ♀ Flower solitary. Floating..................PISTIA. 1
  a Spadix free, enveloped in the spathe...(*c*)
  a Spadix naked, destitute of a spathe.—*b* Leaves ensiform......................ACORUS. 7
                  —*b* Leaves oval, &c..........................ORONTIUM. 6
    c Flowers covering only the base of the spadix. Perianth 0.................ARISÆMA. 2
    c Flowers covering the whole spadix, or all but the base, and...(*d*)
      d Monœcious. Spathe involute. Stamen around a shield...............PELTANDRA. 3
      d All perfect.—*x* Perianth 0. Spathe open, white. Swamps............CALLA. 4
              —*x* Perianth regular. Spathe shell-form....................SYMPLOCARPUS. 5
    y Spadix naked at the top. Spathe yellowish. Leaves peltate..............COLOCASIA. 8
    y Spadix naked at the top. Spathe yellowish. Leaves not peltate..........PHILODENDRON. 9
    y Spadix covered with flowers. Spathe white.—*z* Leaves green only.........RICHARDIA. 10
                  —*z* Leaves variegated.........CALADIUM. 11

1. PÍSTIA, L. Spathe tubular at base, spreading above. Fls. *8*, few, the upper ♂ in an involucre, of 3—8 anther-cells. ♀ Fl. solitary, of a 1-celled ovary and thick style. Berry several-seeded. ♒

P. spathulàta Mx. Floating free in still water; leaves 1—2′, obovate-spatulate, rosulate, the veins lamellated beneath; spathe white. E. Fla.

2. ARISǼMA, Mart. DRAGON-ROOT. INDIAN TURNIP. Spathe convolute at base. Spadix with a long naked summit, flower-bearing at base. ♂ Fls. above the fertile, each merely a cluster of 4 or more stamens. ♀ Ovary 1-celled, stig. flat. Berry red, 1- or few-seeded. ♃ Root tuberous. Scape sheathed with the petioles.

1 **A. triphýllum** Torr. *Jack-in-the-pulpit.* Stem a large corm fiercely acrid; scape round, thick, 8—12′; leaves 2, trifoliate; leaflets oval, pointed, sessile; spathe striped, inflected over the club-shaped spadix. Rocky woods. April+.

2 **A. quinàtum** Wood. Leaves 1 or 2, with very long sheaths, one or both *quinate;* leaflets oval to lance-oval, acute, or obtuse, cuspidate, narrowed to a petiolule. Ga. to Car., in hilly woods. 1—2f. (A. polymorphum Buckley.)

3 **A. Dracóntium** Schott. *Green Dragon.* Leaf mostly 1, pedate, with 7—11 lance-oblong leaflets; spadix subulate, longer than the spathe. Bogs. 2f.

3. PELTÁNDRA, Raf. Spathe convolute. Spadix staminate above, pistillate below. Anth.-cells 8—12, opening at top, adnate to a thickened peltate connectile. Berries 1-∞-seeded. ♃ Leaves sagittate, the long petioles sheathing the scape. May, June.

1 **P. Virgínica** Raf. Leaves sagittate-hastate, the base lobes long and turned outward; spathe green, 4—6′ long; berries green, 1-3-seeded. Marshes. 9—18′.

2 **P. glauca** Feay. Leaves sagittate-cordate, lobes rounded; spathe white and open at the top, 3′; berries ∞-seeded, red. Coastward, S. (Xanthosoma, Sch.)

4. CALLA, L. Spathe ovate, spreading, white. Spadix covered with the naked fls. Perianth 0. Fil. 6, slender, with 2-celled anthers. Berry red, depressed, 3–6-seeded. ♃ ♒ Rhizome creeping. Leaves cordate.

C. palústris L.—Shallow waters, Pa., and N. Scape 4—6′. Leaves 2—3′. July.

5. SYMPLOCÁRPUS, Salisb. SKUNK CABBAGE. Spathe shell-form, thick, close to the ground in early Spring, preceding the leaves, incurved at base and apex. Spadix oval, covered with the dull purple, perfect fls. Perianth 4-parted. Berries 1-seeded. ♃ ♒ Leaves all radical, very large.

S. fœtidus Salisb.—Swamps, meadows: common. Leaves cordate-oval, 12—20′.

6. ORÓNTIUM, L. GOLDEN CLUB. Spathe 0. Spadix cylindrical, yellow, crowning the naked scape. Perianth 4–6-sepalled. Sta. 4—6. Fr. a dry utricle, 1-seeded. ♃ ♒ Leaves lanceolate, all radical.

O. aquáticum L.—Pools and brooks. 1f. Very smooth. Scape thickened upward, green at base, white above, the summit (flowers) golden yellow. June.

7. ÁCORUS, L. SWEET FLAG. Spathe 0. Spadix cylindric, sessile, issuing from the side of a leaf-like scape. Perianth 6-sepalled. Sta. 6. Ova and fruit 3-celled, capsular, ∞-seeded. ♃ Rhizome thick, aromatic. Lvs. all radical, linear-ensiform like the scape.

A. Cálamus L. Scape ensiform, continued long and leaf-like above the green, dense-flowered spadix. In wet soils. 2—3f. Root tastes warmly pungent. June, July.

8. COLOCÀSIA ANTIQUÒRUM, from Egypt, &c., has large (2—3f) ovate-sagittate, peltate, repand leaves, on petioles longer than the scape. Spathe erect, much longer than the spadix. Cultivated for food, and for ornament.

9. PHYLLODENDRON GRANDIFÒLIUM. Stems rooting, running or climbing. Leaves very large (2—4f), opaque, strongly veined, cordate-sagittate, acute, entire. Petioles terete, red-spotted. Spathe yellowish. S. America.

10. RICHARDIA AFRICÀNA (Kunth, Calla Æthiopica L.). Known everywhere as the Ægyptian Calla, but native of the Cape of Good Hope: is a grand house-plant, 2—4f, with large hastate-cordate leaves, round scapes, a large milk-white spathe rolled in at base and back at apex, surrounding a yellow cylindric spadix.

11. CALÀDIUM BÍCOLOR. Roots tuberous. Lvs. radical, peltate, hastate-cordate, short-pointed, variegated with crimson or purple at the centre, or pellucid at base, or white-spotted. A splendid leaf-plant. Panama!

ORDER CXXXI. LEMNACEÆ. DUCKMEATS.

Herbs minute, stemless, floating free upon the water, and consisting of a leaf-like frond, or a tuft of leaves, with one or more fibrous roots. *Flowers* bursting from the substance of the frond, or axillary, enclosed in a spathe, *the sterile* consisting of 1 or 2 stamens, *the fertile* of a 1-celled ovary. *Fruit* a utricle, with 1 or more seeds. *Emb.* straight, in fleshy albumen. Fig. 516.

1. LEMNA, L. DUCKMEAT. Fls. from a chink in the edge of the frond, 2 sterile, each a single recurved stamen, with 1 fertile,—an ovary with style and stigma. Ovules and seeds 1—7. ① ♃ Fronds 1—7″ long. Roots hair-like. Flowers rarely seen.

§ Ovule solitary. Frond with a single root. (LEMNA *proper*)....... ....Nos. 1—3
§ Ovules 2. Frond many-rooted. (Spirodela, Schleiden)........ ....No. 4

1 **L. trisúlca** L. Fronds oblong, as long (2—3″) as their stalks, proliferous from their sides, thin, obtuse. Pools of clear water, in patches.

2 **L. perpusílla** Torr. Fronds thin, 3-veined, round-obovate, 1—2″, in groups of 3—7; style slender; seed round-oblong, erect. Ponds, N. Y., W. and S. August.

3 **L. minor** L. Fronds thick, veinless, obovate or roundish, 1—2″, single or in groups of 2—4; style short; seed ovoid, half-erect. Stagnant waters: common.

4 **L. polyrrhìza** L. Fronds oval, 2—3″, thickish, 5-7-veined, purplish beneath, each with a bundle of black roots beneath. Stagnant waters: rare.

2. WOLFFIA, Horkel. Fls. from the centre of the minute frond, 2 only; ♂ flower a stamen with a 1-celled anther. ♀ Ovary with a very short style, ovule and seed 1. ① Fronds ⅛—½″, rootless, separate.

W. Columbiàna Karsten. Frond round-oval. Floating, with Lemna, seeming mere specks of green—the least of all flowering plants. Not rare.

ORDER CXXXII. TYPHACEÆ. TYPHADS.

Herbs growing in marshes and ditches, with rigid, ensiform, sessile leaves. *Flowers* monœcious, arranged on a spadix or in heads, with no spathe.

Perianth of a few scales, or a tuft of hairs, or 0. *Stamens* 1—4, with long, slender filaments. *Ovary* with 1 pendulous ovule. *Seed* albuminous, with an axial embryo. Fig. 211.

1. TYPHA, L. CAT-TAIL. REED-MACE. Spadix long, cylindric, dense, sterile above. ♂ Sta. 3 together, united into a common filament. ♀ Ova. pedicellate, surrounded at base by a hair-like pappus or calyx. ♃ Fls. very numerous, packed solid in the large brown terminal spadix.

1 **T. latifòlia** L. Leaves linear, flat, exceeding the stem; spadix cylindric, the sterile and fertile contiguous. Tall and smooth, 3—5f, in swamps.

2 **T. angustifòlia** L. Leaves linear, channelled, exceeding the stem; spadix cylindric, the sterile some remote from the fertile. Swamps. 2—4f.

2. SPARGÀNIUM, L. BURR REED. Spadices or globular heads many, the lower fertile, consisting of sessile pistils, each with 3—6 sepals, and forming 1-seeded nuts. Sterile heads a mass of stamens with scales intermixed. ♃ ♒ August.

* Stigmas mostly 2. Stems of the inflorescence branching, erect................No, 1
* Stigma always single. Stem subsimple, erect or floating...................Nos. 2, 3

1 **S. eurycárpum** Eng. Stout, 1—3f; lvs. very long, carinate beneath; fruit heads 1′, nuts large, obpyramidal, truncate, sessile; sterile heads numerous. Borders of rivers and ponds, N. Eng. to Pa., and W. (S. ramosum C-B.)

2 **S. simplex** Huds. Erect, slender, 1—2f; leaves triangular at base, long and narrow; sepals spatulate, denticulate; nuts beaked and stiped; heads 6—8″ broad, the ♂ more than the ♀. Ponds and bogs, N. and W.

β. ***natans.*** Leaves floating, flat; stigma shorter than the style; heads few.

3 **S. mínimum** Bauhin. Slender, weak, simple, erect or floating; leaves narrow, flat; heads few, axillary, small (3—4″); fruit scarcely beaked, sessile. Streams, N. Eng., and W. (S. angustifolium C-B.)

ORDER CXXXIII. NAIADACEÆ. NAIADS.

Water plants with jointed stems, and sheathing stipules, or sheathing petioles. *Flowers* perfect or diclinous, naked or with a 2-4-parted perianth. *Stamens* definite. *Ovaries* free, sessile, 1-ovuled. *Stigma* simple, often sessile. *Fruit* indehiscent. *Seed* without albumen, with a straight or curved embryo.

* Flowers axillary, sessile, the staminate reduced to a single stamen...(*a*)
a Fertile flowers reduced to a single pistil, with 2 or 3 stigmas. Leaves opposite...NAJAS. 1
a Fertile flowers with about 4 pistils in a cup, with as many stigmas.............ZANNICHELLIA. 2
* Flowers spadaceous, or 2—20, sessile on a spadix or spike...(*b*)
b Flowers monœcious, seated in 2 rows on the side of a linear, flat spadix ....ZOSTERA. 3
b Flowers perfect, naked, 2—5, 4-merous. Fruit raised on slender stipes...........RUPPIA. 4
b Flowers perfect. Perianth 4-sepalled. Stamens 4. Pistils and achenia 4.......POTAMOGETON. 5

1. NAJAS, L. WATER NYMPH. ♂ Fl. a solitary stamen, in a little hooded spathe. ♀ Fl. a naked pistil with 2—4 subulate stigmas. Fr. a little 1-seeded, drupe-like nutlet. ♒ Entirely submersed. Lvs. opposite, linear, broader at base, toothed. Flowers axillary.

1 **N. major** All. Stem frail and slender, 1—3f; leaves 1′ and less, crowded above with conspicuous spinulous teeth; nutlets ovoid, 1½″ long. N. Y. (Clinton).

2 **N. Indica** Cham., β. ***gracillima.*** Stems filiform, forking; leaves opposite and in 3's, very narrowly linear, remotely spinulous-serrate. N. Y. and Pa. (Porter).

3 **N. fléxilis** Rostk. Leaves narrowly linear, in 3's, 4's, and 6's, minutely serrulate, as well as their abruptly-widened sheathing base, 3—12″. Ponds: common.

2. ZANNICHÉLLIA, Micheli. HORN PONDWEED. Fls. 8, both kinds together in the same axil. ♂ Sta. 1, with a slender fil. ♀ Cal. of 1 sepal, cor. 0. Ova. 4 or more, each with a style and stig. Fr. 4 or more oblique achenia. ≈ Submersed, with filiform branches, and linear, entire leaves.

Z. palústris L. Stems round, leafy, 1—2f; leaves opposite, grass-like, 2—3′; anther 4-celled; achenia 4—6, toothed on the back. Pools and ditches: rare.

3. ZÓSTERA, L. SEA WRACK. Spadix linear, leaf-like, bearing the 8 fls. in 2 rows on one side. Perianth 0. ♂ Anther ovoid, sessile, opening lengthwise, with hair-like pollen. ♀ Ova. as long as the anther, style bifid. Utricle 1-seeded. ♃ ≈ Stipules united into a sheath. Leaves grass-like.

Z. marìna L. Rhizome creeping, sending up long simple stems; lvs. alternate, ribbon-like, 1—5f long; spadix 2′, in a spathe at base of a leaf. Grows in the sea, along shore, Me. to Ga., and is washed up by the waves.

4. RÚPPIA, L. DITCH-GRASS. Fls. ☿, 2 together on a spadix arising from the sheath of a leaf. Perianth 0. Anthers 2, large, sessile, 2-celled. Ovaries 4, fruit 2—4 dry drupes on pedicels. ♃ ≈ A grass-like plant, all submersed but the flowers. Flower-stalk at length very long.

R. marítima L. Stems filiform, branched, 2—5f; leaves linear-setaceous, 2—6′, on inflated sheaths; flowers arising to the surface. Seas, and lakes (Hankenson), E.

5. POTAMOGÈTON, Tourn. POND-WEED. Fls. ☿ on a spadix arising from a spathe. Cal. 4-sepalled. Anth. 4, alternate with sepals. Ova. 4. Ach. 4, sessile, flattened on one or two sides. Seeds curved or coiled. ≈ Mostly ♃, only the spadix with its 3—10 small green fls. arising to the surface of the water. Lvs. stipulate, the upper often opposite. Fr. July, Aug.

§ Leaves of two kinds, the floating oval-elliptical, coriaceous, petiolate; stipules free from the petiole, connate; submersed leaves thin...(*)
  * Submersed leaves linear or reduced to mere petioles.................. Nos. 1—4
  * Submersed leaves lanceolate, rarely lance-linear........................ Nos. 5—8
§ Leaves all similar, submersed, mostly thin and membranous...(*a*)
  a Leaves lanceolate or lance-oblong, petiolate or merely sessile.......... Nos. 9, 10
  a Leaves oval or oblong, broad and clasping at base.................. Nos. 11—13
  a Leaves linear or setaceous.—*x* Stipules 0, or adnate to the leaf....... Nos. 14, 15
    —*x* Stipules free.—*y* Stems flat.......... Nos. 16, 17
      —*y* Stems filiform...... Nos. 18—20

1 **P. natans** L. Subsimple; floating lvs. 2—3′, lance-oblong, narrowly obtuse, on slender ([illegible]—6′) petioles; stipules long, linear; lower lvs. few, linear, 2—6′; spikes 1—2′, on thick peduncles much longer; fruit turgid, 3-keeled. Ponds and ditches.

2 **P. Claytòni** Tuckm. Simple; floating leaves lance-oblong, about 15-veined, 1—1½′, longer than their petioles, opposite; lower lvs. linear, 3-veined, 3—6′ × 1″, spikes and their peduncles near 1′; fruit orbicular, 3-keeled. Streams and ponds: common.

β. ***heterophýllus.*** Petioles and peduncles longer than the leaves (2—3′). Mass.

3 **P. hýbridus** Mx. Stems branching, filiform; floating lvs. oval, 5-7-veined, 7—10″, their petioles shorter, subopposite; spikes and their stalks 4—6″; lower lvs. linear-setaceous, 1—3′, many; fruit minute, dentate. Common.

β. ***diversifolius.*** Leaves nearly all floating, oval, the lower few and short.

4 **P. Spirillus** Tuckm. Very delicate, branched; floating lvs. oval to lanceolate, 5-9-veined, 7—10″, on short broad petioles; lower leaves narrowly linear, obtuse, 1—2′; submersed ped. 1-2-flowered; embryo a little *spiral.* Streams: rare.

5 **P. gramíneus** L. Stem much branched, terete; floating lvs. long-stalked, ovate to oblong, acutish, 13-veined; lower leaves lanceolate to lance-linear, pointed, stip. obtuse; fruit small, obtuse-angled. Common, and very variable.

6 **P. flùitans** Roth. Lvs. long-stalked, the floating thinnish, opposite, elliptic-oblong, the submersed linear-oblong, all acute both ways, 11–21-veined; fruit acutely 3-keeled on the back. In ponds and rivers. (P. lonchitis Tuckm.)

7 **P. pulcher** Tuckm. Stem simple; floating leaves ovate, subcordate, 25–35-veined, 3—5′, alternate; upper submersed lvs. lanceolate, long-acuminate, undulate, the lower oval-oblong; fruit 3-keeled. Penn., N. J. (Prof. Porter), N. and W. Rare.

8 **P. amplifòlius** Tuckm. Stems simple; floating leaves oval to elliptical, 2½—4′, 35–45-veined, on long, opposite stalks; submersed lvs. larger than the floating, 5—7′, lanceolate, short-stalked, or sessile. Ponds. (P. fluitans C-B.)

9 **P. lucens** L. Leaves large, often *shining*, lance-oval, 3—5′ × 1′, pointed and *mucronate*, on short stalks; spike 2′; fruit roundish, slightly keeled. Rivers and lakes.

10 **P. obrùtus** Wood. Stem simple; leaves *all submersed*, narrow-lanceolate, 3′, obscurely 7-veined, subsessile, acute; spike 1′, the stalk 2′; fruit inflated, acutely keeled, conspicuously umbilicate both sides. Slow waters. No floating leaves.

11 **P. prælóngus** Wulf. St. *very long*, branched; lvs. lance-ovate to lanceolate, obtuse, half-clasping, often large; peduncle very long (3—5′); fruit sharp-keeled. Rivers.

12 **P. perfoliàtus** L. Stem branched; lvs. cordate-clasping, roundish to ovate, obtuse; ped. short, few-flowered; fruit not keeled. Ponds and slow waters: common.

13 **P. crispus** L. Branched below; leaves 3-veined, half-clasping, narrow-oblong, obtuse, 1—2′, crisp-wavy; fruit acuminate-beaked. Penn., and E. (Prof. Porter).

14 **P. pectinàtus** L. Stem flexuous, repeatedly forking; leaves linear-setaceous, 2—3′; spike interrupted, on a long filiform peduncle; fruit large (2″), rough. E. and N.

15 **P. Robbínsii** Oakes. Stem very branching; leaves lance-linear, crowded, sheathing the stem with their bases; spikes on short peduncles. N. and W.

16 **P. comprèssus** L. St. branching, flattened; lvs. linear, ∞-veined, 2—4′ × 1—2″; stip. obtuse; spike 12–15-flowered, much shorter than the peduncle. Ponds.

17 **P. obtusifòlius** Mert. and Ktch. St. branching, flattened; lvs. linear, 3-veined; stip. obtuse; spike 6–8-flowered, as long as the peduncle. Pa., and N-W.

18 **P. pauciflòrus** Ph. St. slightly flattened, much forked; lvs. linear, 1—3″ × ½—1″; flowers few (3—12) in the spike; fruit distinctly crested. Rivers, &c.

19 **P. pusíllus** L. Stem filiform, branched; leaves linear, varying to capillary, 1-3-veined; spikes 3–5-flowered, long-stalked; fruit not keeled. Shallow waters.

20 **P. Tuckermàni** Robbins. Very slender and delicate, forked; lvs. capillary and confervoid; spike 6–9-flowered, on a very long peduncle (5′). Ponds, Pa., and N.

COHORT 6. FLORIDEÆ.

ENDOGENOUS PLANTS with the flowers usually perfect and complete, the perianth double, 3-parted, the outer often, and sometimes both, green.

ORDER CXXXIV. ALISMACEÆ. WATER PLANTAINS.

Marsh *herbs*, with parallel-veined, petiolate leaves and branching peduncles. *Flowers* perfect or monœcious, with a regular double perianth.

Sepals 3, green. *Petals* 3, colored or green. *Stamens* hypogynous. *Ovaries* 3 or more, separating into as many distinct fruits.

§ BUTTOMEÆ. Petals colored. Carpels 6—20, each with ∞ ovules..............HYDROCLEIS. 1
§ ALISMEÆ. Petals colored. Carpels many, 1-2-seeded...(*x*)
§ JUNCAGINEÆ. Petals green. Carpels 3, each 1-3-seeded...(*y*)
  x Flowers monœcious. Stamens many..............SAGITTARIA. 4
  x Flowers all perfect.—*z* Stamens 9—24..............ECHINODORUS. 3
    —*z* Stamens 6. Flowers panicled..............ALISMA. 2
  y Anthers oval. Carpels 1-seeded. Leaves radical..............TRIGLOCHIN. 5
  y Anthers linear. Carpels 2-3-seeded. Leaves cauline..............SCHEUCHZERIA. 6

1. **HYDRÓCLEIS** HUMBÓLDTII (or Limnocharis), from Brazil, grows in pools, like Sagittaria, with long-stalked, oval, 7-veined leaves and large (2—3′) orange-yellow flowers. Sepals small. Stamens 18—24. Ovaries 6.

2. **ALÍSMA,** L. WATER PLANTAIN. Sepals persistent. Petals involute in the bud. Ovaries and styles arranged in a circle, forming many flattened achenia. ♃ ≋ Acaulescent.

A. Plantágo L. β. ***Americànum.*** Lvs. 5-7-veined, ovate or oval, subcordate, pointed; scape many-flowered, fls. whorled, small, rose-white. Pools. 1—2f. July, Aug.

3. **ECHINODÒRUS,** Rich. Sepals persistent. Petals imbricate in bud. Sta. 6—∞. Ovaries and styles ∞, imbricated, forming many flattened, beaked achenia. ≋ Scape creeping or erect. Fls. small, white, whorled.

1 **E. rádicans** Eng. Leaves large (5—12′), 7-veined, cordate, ovate, on long petioles; scape prostrate, running and rooting; flowers clustered at the nodes, white; stam. 18—24; ovaries very many. ♃ Swamps, Ill. to Ga. June, July.

2 **E. rostràtus** Eng. Leaves 1—3′, ovate, cordate, on long petioles; scapes erect, sharply angled; stamens 12; carpels ∞, strongly ribbed and beaked. ① West.

3 **E. párvulus** Eng. Leaves lance-elliptic, as long as the petioles (1′); scapes 3-6 flowered; stamens 9; carpels about 20, beakless; flowers about 3″. ① E. and W.

4. **SAGITTÀRIA,** L. ARROWHEAD. Fls. ⚥ or ♂ ♀, in whorls of 3 on the scape, the lower fertile. Petals white, larger than the sepals, imbricated in bud. Sta. ∞. Ovaries very ∞, crowded in a head. Achenia flattened, margined, and beaked. ≋ Juice milky. Leaves on long radical stalks, sagittate to linear. Summer.

* Leaves mostly arrow-shaped. Filaments slender, elongated..............Nos. 1, 2
* Leaves lanceolate to linear, very rarely with narrow, base lobes...(*a*)
  a Filaments as long as the anthers. Pedicels all subequal..............No. 3
  a Filaments thick, shorter than anthers.—*x* Fertile pedicels very short.....No. 4
    —*x* Pedicels subequal..........Nos. 5, 6

1 **S. variábilis** Eng. Scape 1—2f, 12-angled; sterile pedicels twice longer than the fertile; filaments much *longer* than the anthers; achenia with a conspicuous averted beak. Waters: common. Flowers about 1′ broad. Varies exceedingly.
  α. Leaves lanceolate, with lance-linear lobes of the same length.
  β. ***obtùsa.*** Leaves ample (6—10′), broad-ovate, obtuse. Fls. ♂ ♀. M., W., and S.
  γ. ***latifòlia.*** Leaves ample, ovate, acute, their lobes ovate, pointed.
  δ. ***grácilis.*** Leaves and their spreading lobes long, linear, acute.
  ε. ***pubéscens.*** Plant pubescent all over; leaves and lobes ovate.

2 **S. calycìna** Eng. Scape soon procumbent; pedicels all subequal; bracts roundish; calyx closed on the fruit; filaments as long as the anthers. Waters. Leaves as in No. 1, but sometimes all linear and floating.

3 S. lanceolàta L. Leaves lance-oblong, rarely linear, tapering to the long petiole; scape branched; 2—3f; achenia obovate-falcate. Swamps, Va. to Fla.

4 S. heterophýlla Ph. Leaves linear-lanceolate, rarely some of them with 1 or 2 base lobes; scape simple, weak; achenia narrow, long-beaked. Common S. and W.

5 S. gramínea Mx. Scape erect, slender, 5—20′; leaves lance-ovate to linear, rarely sagittate; pedicels all equally slender; achenia beakless; flowers 8—9″ diameter.

β. ***platyphýlla.*** Leaves lance-ovate; flowers larger, 1′ broad. South.

6 S. pusílla N. Scape shorter than the leaves (2—4′); leaves linear, shorter than the petioles; flowers few, the fertile but one, deflexed; stamens about 7. N. J., and S.

7 S. natans Mx. Scape mostly erect, 3—6′; leaves oval-lanceolate, floating, obtuse, 3-veined; lower pedicels longest; achenia angular, short-beaked. South.

5. **TRIGLÒCHIN,** L. ARROW-GRASS. Sepals and petals concave, deciduous (green). Sta. 6, very short, anth. large, extrorse. Ova. 1-ovuled, 3—6, united and indehiscent in fruit. ♃ Leaves all radical, grass-like Scape jointless, and bractless. Flowers small. July.

1 T. marítimum L. Fruit ovate-oblong, grooved, of 6 united carpels; scape longer (9—18′) than the leaves. Salt marshes and Lake shores, northward.

2 T. palústre L. Fruit nearly linear, of 3 united carpels; scape scarcely longer than the numerous and very narrow leaves. Marshes, N. Y., and N. 6—12′.

6. **SCHEUCHZÈRIA,** L. Sep. and pet. oblong, acute, persistent. Sta. 6, with linear anthers. Ovaries 1-2-ovuled, becoming flattened inflated capsules. ♃ Leaves cauline, sheathing at base, linear.

S. palústris L.—A rush-like plant, in swamps, Vt. to Ill. (J. Wolf). Root-stock horizontal, fleshy. Stem 1f. Leaves semicylindric, 4—8′. Flowers yellowish green, in a bracted raceme. Stamens large, exserted. July.

ORDER CXXXV. HYDROCHARIDACEÆ. FROGBITS.

Aquatic *herbs*, with parallel-veined *leaves* and diclinous *flowers* solitary or spicate. *Perianth* regular, 3–6-parted, the inner segments petaloid. *Stamens* 3—12. *Ovary* adherent, 1–9-celled, with 3, 6, or 9 *stigmas*. *Fruit* dry or juicy, ∞-seeded, indehiscent.

* Leaves all radical, roundish, floating in stagnant waters.. ....LIMNOBIUM. 1
* Leaves opposite or verticillate in 3's and 4's on the stems, submersed.................ANACHARIS. 2
* Leaves all radical, grass-like, in water.................. ....VALLISNERIA. 3

1. **LIMNÒBIUM,** Rich. FROG'S-BIT. Fls. ⚥. Spathes subsessile, the ♂ 1-leaved, about 3-flwd., the ♀ 2-leaved, 1-flwd. Perianth showy, white. Sta. 6—12 (mere rudiments in ♀). Ov. 6–9-celled, becoming a ∞-seeded berry. ♃ ♒ Stoloniferous. Lvs. on long stalks, subcordate. July, Aug.

L. Spóngia Rich.—Lake Ont. (rare), and S. Lvs. 1—1½′, purplish and *spongy* beneath

2. **ANÁCHARIS,** Rich. DITCH MOSS. Fls. ♂ ☿ ♀, solitary. Spathe axillary, bifid. Perianth 6-parted, colored, small, the fertile excessively produced above the adherent ovary into a capillary tube. Style capillary, with 3 large stigmas. Fruit few-seeded. ♃ ♒ Wholly submersed. Aug.

A. Canadénsis Planc. Stems filiform, long, forking; very leafy; leaves linear-oblong, serrulate, 5—10″; tube of the dingy-white fls. 2—10′ long! Streams and bogs.

3. VALLISNÈRIA, Mich. EEL-GRASS. Fls. ♂ ♀. Spathe ovate, 2–4-parted. ♂ Spadix or spike covered with minute naked fls. ♀ Fl. solitary, a slender perianth with linear segm. and 3 bifid stig. Fr. cylindrical, ∞-seeded. ♃ ≈ Fertile flowers on long spiral scapes. July, Aug.

V. spiràlis L. Lvs. 1—2f long, obtuse, ¼′ wide, scapes of the sterile plants short, of the fertile filiform, tortuous, 2—4f, bearing the single white fl. at or near the surface.

ORDER CXXXVI. BURMANNIACEÆ.

Small annual *herbs*, with naked or scaly *stems* and scale-like tufted *leaves*. *Flowers* perfect. *Perianth* tubular, 6-toothed, adherent. *Stamens* 3 or 6. *Capsule* 1- or 3-celled. *Seeds* ∞, minute, in a loose testa.

1. APTÈRIA, N. Perianth tube longer than the slender teeth, which are alternately narrower. Caps. globular, 1-celled. ① Apparently leafless.

A. setàcea N. Erect, very slender, 4—6f, with remote subulate scales, and bearing above 1 or 2 racemes; flowers 3—4″, purplish, distant. Woods, Fla., and W.

2. BURMÀNNIA, L. Perianth tube scarcely produced above the ovary, often 3-winged below, limb with the 3 inner teeth much shorter. Capsule prismatic, often 3-winged, 3-celled. ① Leafless.

1 **B. biflòra** L. Stems capillary, simple, 2—3′, with scarcely perceptible bracts, and 1 or 2 (rarely more) light-blue flowers, 2—3″ long at top. Swamps, Va., and S. Oct.

2 **B. capitàta** (L). Stem setaceous, 6—8′, simple, bearing at top a dense cluster of white flowers, and a few subulate bracts. Uplands, S.: less common. Sept.

ORDER CXXXVII. ORCHIDACEÆ. ORCHIDS.

Herbs perennial with fleshy *roots*, simple, entire, parallel-veined *leaves*. *Flowers* very irregular, with an adherent, ringent *perianth* of 6 parts. *Sepals* 3, usually colored. *Petals* 3, odd one (lowest by the twisting of the ovary), called the lip, diverse in form from the others, sometimes lobed, often spurred. *Stamens* 3, gynandrous (consolidated with the style), some of them abortive, *pollen* powdery or waxy. *Ovary* inferior, 1-celled, *capsule* 3-valved. *Seeds* innumerable. Figs. 71, 105, 240, 247, *b*. 263, 291, 435.

§ CYPRIPEDIEÆ. Anthers, the 2 lateral fertile, the terminal petaloid...(*a*)
a Lip a large, inflated, spurless sac. Petals and sepals spreading................CYPRIPEDIUM. 1
§ OPHRYDEÆ, &c. Anthers, only the upper *one* fertile, 2-celled...(*b*)
b Lip a large inflated sac, 2-spurred under the apex. Leaf 1........................CALYPSO. 2
b Lip produced behind into a spur, which is free from the ovary...(*c*)
b Lip spurless, or the spur adheres to the ovary (except in No. 13)...(*d*)
c Anther fixed; pollen-masses 2, club-shaped, in 2 separate cells.............ORCHIS. 3
c Anther lid-like, on the end of the stigma; pollen-masses 4....................TIPULARIA. 4
d Plants brown and leafless, rarely with radical leaves...(*e*)
d Plants green and (except No. 16) furnished with leaves...(*m*)
e Lip hooded, *i. e.*, its margins involute. Perianth spreading.................BLETIA. 5
e Lip concave, sessile, often with an adnate spur..................................CORALLORHIZA. 6
e Lip concave, raised on a claw. Plant with 1 late leaf...........................APLECTRUM. 7
m Lip flat. Flowers obscure, in racemes, nearly bractless...(*n*)
m Lip flat, expanded and lobed, tubercled at base. Flowers showy... ...ONCIDIUM. 8
m Lip channelled, reflexed. Flowers whitish, in bracted spikes...(*o*)
m Lip bearded or 3-lobed. Stamen lid-like. Flowers showy...(*x*)

n Lip entire, dilated. Column minute. (Leaf 1). ....MICROSTYLIS. 9
n Lip sagittate or cordate. Column elongated. Leaves 2............LIPPARIS. 10
n Lip 2-lobed or cleft at apex. Leaves 2 cauline, opposite............LISTERA. 11
o Lip with 2 lateral callosities, not at all saccate..........................SPIRANTHES. 12
o Lip without callosities, saccate, or even spurred at base................GOODYERA. 13
x Flowers greenish. Lip *posterior*, and beardless........................PONTHIEVA. 14
x Flowers purple. Lip *posterior*, and bearded..........................CALOPOGON. 15
x Flowers purplish. Lip *anterior* (as in most Orchids)...(*y*)
y Column free from the lip. Calyx spreading............................POGONIA. 16
y Column adnate to the lip below. Calyx erect. Leaves 0...... ....ARETHUSA. 17
y Column adherent to the lip. Calyx spreading. On trees, South........EPIDENDRUM. 18

1. CYPRIPÉDIUM, L. LADY'S SLIPPER. The 2 lower sepals united into 1 leaf, or rarely distinct. Pet. spreading. Lip inflated, saccate, obtuse. Column terminated by a petaloid lobe (barren stamen), and bearing a 2-celled anther under each wing. ♃ With large plaited leaves and large showy flowers. May, June. Fig. 71.

§ Sepals 3, the two lower entirely distinct. Stem leafy....... ....No. 1
§ Sepals 2, the lower composed of two united nearly to the tip...(*a*)
a Stem a leafless scape, 2-leaved at base. Flower rose-colored..............No. 2
a Stem leafy.—*x* Flowers solitary or several, white or rose-colored.....Nos. 3, 4
—*x* Flowers 1–3, mostly 1, yellow. Plant pubescent......Nos. 5, 6

1 C. arietìnum Ait. *Ram's Head.* Stems usually clustered, 8—12′, each 1- or 2-flwd.; leaves elliptical; upper sep. oblong-ovate, the lateral sep. and pet. lin.-lanceolate, lip obconic, as long as the pet. Damp woods, N. Eng. to Wis., and N. Curious.
2 C. acaùle Ait. Scape 10—14′, bearing a single large (2′) flower; lvs. elliptic-oblong; pet. lanceolate, shorter than the large boat-shaped lip. In damp woods. Beautiful.
3 C. spectábile Sw. Stem leafy, 2f, hairy; lvs. lance-ovate, acuminate; sep. broad-ovate, obtuse, the lower (double) one smaller; lip 2′, white-purple. Swamps. Superb.
4 C. candìdum Willd. St. leafy, 1f; lvs. oblong-lanceolate, acute; fl. 1; sep. subequal; lip 1′, compressed, white, shorter than the (2′) pet. Woods and prairies.
5 C. parviflòrum Salisb. St. very leafy, 8—12′; lvs. lanceolate, acuminate; sepals ovate to lance-ovate; lip *depressed*, shorter than the petals. Low woods and prairies.
6 C. pubéscens Sw. *Large Yellow L.* Stems usually clustered, 1f or more; leaves broadly lanceolate, acuminate; sepals lanceolate; lip compressed laterally, *moccasin-shaped*, shorter than the linear, twisted petals. Woods, meadows, and prairies.

2. CALÝPSO, Salisb. Sep. and pet. subequal, ascending. Lip large, inflated, with 2 spurs dependent beneath near the apex. Column petaloid. Pollinia 4. ♃ Scape 1-leafed at base, 1-flwd. above, arising from a corm.

C. boreàlis Salisb.—Old mossy woods, Vt., N. Y., W. to Oregon! Scape 6—8′; leaf broad-ovate, 1—2′; flowers purple and yellow, 1½′. Rare eastward. May.

3. ORCHIS, L. Sepals and pet. similar, some of them ascending and arching over the column. Lip turned downward, produced at base into a spur which is free from the twisted ovary. Sta. 1, anth. 2-celled, a pollen-mass in each cell.—Fls. racemed on the stem or scape. June—August. (Includes Habenaria, Gymnadenia, and Platanthera.)

* Leaves only 2,—*a* ovate, nearly as long as scape. Flowers rose-white........No. 1
—*a* roundish, the scape much longer. Flowers greenish...Nos. 2, 3
* Leaf only 1. Flowers greenish-white. Lip entire or 3-lobed ....Nos. 4, 5
* Leaves several, clothing the stem more or less...(*b*)
b Lip undivided,—*c* entire, white or greenish...............................Nos. 6, 7

—*c* crenulate or wavy, white or yellow................ Nos. 8, 9

—*c* 3-toothed. Flowers yellowish or greenish....... Nos. 10—12

—*c* fringed. Flowers bright yellow or white....... Nos. 13—15

b Lip 3-parted,—*x* segments fringed. Flowers white or greenish..... Nos. 16, 17

—*x* segments fringed. Flowers purple................. Nos. 18, 19

—*x* segments merely toothed. Flowers violet-purple....... No. 20

—*x* segments entire, long, linear-setaceous............. Nos. 21, 22

1 **O. spectábilis** L. Lvs. rarely more than 2, 3—6′; scape 4—6′, bearing 1 or 2 lanceolate bracts and 3—5 showy flowers above; spur clavate. Rocky thickets. Pretty.

2 **O. orbiculàta** Ph. Lvs. 2, roundish, 3—6′, fleshy; scape bracted, 1—2f; upper sepals round, the lateral ovate, half as long as the lip (9—12″). Woods, E. and W.

3 **O. Hookeri** Wood. Lvs. 2, round-oval, fleshy, 4—5′; scape naked, 8—12′; upper sepals ovate, erect, the lateral deflexed and meeting behind; spur 1′. Woods, N.

4 **O. obtusàta** Ph. Leaf oblong-ovate, obtuse, 2—3′, near the base of the stem; lip linear, entire, with 2 tubercles at base, as long as the spur. In mud, N.

5 **O. rotundifòlia** Ph. Leaf round-ovate, radical; scape few-flowered; lip 3-lobed, obcordate, side lobes falcate; spur as long as the lip. Penn., and N.

6 **O. hyperbòrea** Willd. Lvs. very erect, lanceolate; spike long: bracts longer than the greenish flowers; petals and lip linear, subequal. Shades, northward. 1—4f.

7 **O. dilatàta** Ph. Slender, 8′—2f; lvs. lance-linear and linear; spike virgate; bracts short; flowers white; lip linear, *dilated-rhombic* at base. Swamps, N.

8 **O. nìvea** Baldw. Very slender, 1—2f; lowest leaf linear, 6—8′, the others subulate, bract-like; flowers white, in an oblong spike; lips oblong. South.

9 **O. íntegra** N. Stem leafy, flexuous, 12—15′; lvs. narrow-lanceolate; spike dense, oval; flowers orange-yellow; lip ovate, longer than sepals. Swamps, N. J., and S.

10 **O. tridentàta** Willd. St. slender, 12—18′; lowest leaf linear-oblong, obtuse, 6′, the others few, small and bract-like; fls. few, greenish; lip 3-toothed at end. Woods.

11 **O. bracteàta** Muhl. St. leafy; lvs. oblong, obtuse or acutish; bracts 2—3 times longer than the small green fls.; lip 3-(or 2-)toothed at end, lin.-cuneate. Shades. 6—9′.

12 **O. flava** L. St. leafy; lvs. oblong to lanceolate; bracts longer than the yellowish-brown flowers; lip oblong, obtuse, a tooth each side at base, and a tubercle in the palate; spur shorter than the ovary. Alluvial soils. (O. virescens Muhl.)

13 **O. cristàta** Mx. Slender, 1½—2f; leaves lance-linear to linear; flowers numerous, small, yellow; sep. and pet. roundish, 1—2″; spur ½ as long as ovary. N. J., and S.

14 **O. ciliàris** L. *Yellow Fringed Orchis.* Stem 2f; leaves lanceolate; flowers large, numerous, orange-colored: lip 4″ long, twice longer than the linear, notched petals; spur 1′. Swamps. Delicately beautiful.

15 **O. Blephariglóttis** Willd. *White Fringed Orchis.* Stem 1—2f; leaves lanceolate; flowers pure white; lip fringed in the middle, 2″ long, lanceolate; spur much longer (1′). Swamps, N. Y. to Car., and westward.

16 **O. lácera** Mx. *Ragged O.* St. smooth, slender, 1—2f; leaves oblong to linear, bracts longer than the flowers; sepals retuse; petals emarginate; flowers ∞; lip segments capillaceous-multifid; spur as long as the ovary. Meadows.

17 **O. leucophæa** N. *White Prairie O.* Lvs. lanceolate, tapering to a narrow obtuse point; bracts shorter than the ovaries; fls. about 12; spur yellowish, curved, twice longer than the ovary; petals white. Wet prairies.

18 **O. Psýcodes** L. *Purple Fringed O.* Leaves lanceolate; lip segments cuneiform, scarcely longer than the ovate, crenulate, slightly fringed petals; spur longer than the ovary. Meadows. 1½—2½f. Flowers light purple.

19 **O. grandiflòra** Bw. *Large Fringed O.* Tall, 2—3f; lvs. oval, oblong, and linear, obtuse; lip segments dependent. fan-shaped, twice longer than the fringed petals. Wet meadows, Penn., and N. Superb. (O. fimbriata.)

20 **O. peramœna** (Gr.) Tall, leafy; leaves lanceolate to lance-linear; sepals round-ovate; petals denticulate; lip middle segment 2-lobed, all merely toothed; spur longer than the ovary. Pa. to Ind., and S. Flowers 20—50, large.

21 O. Michaùxii (N.) Very leafy; leaves elliptic-oval, the upper reduced; flowers few, white; petals 2-parted, the lower divisions linear-setaceous, like those of the lip; spur twice as long as the ovary; flowers white. South.

22 O. repens (N.) Stem very leafy from a creeping rhizome; leaves all lance-linear, long; flowers greenish-yellow, dense in the spike, much smaller than in No. 21, but otherwise similar. Pine-barrens, S. August, September.

4. **TIPULÀRIA,** N. Sepals spatulate, spreading. Petals lance-linear. Lip sessile, 3-lobed, middle lobe linear. Spur filiform, very long. Column free. Anth. opening by a lid, with 4 pollen-masses. ♃ Corms several, connected by a thick fibre. Leaf 1. Flowers bractless.

T. díscolor N.—Pine woods, Vt. to Ga. Leaf ovate, petiolate, 2—3′. Scape 10—15′; raceme with many small, greenish, nodding flowers. July.

5. **BLÈTIA,** R. & P. Pet. and sep. subequal, distinct. Lip hooded at end (spurless in our species). Column free. Pollinia 8, in pairs, waxy, each pair pedicellate. ♃ Flowers racemed, showy.

1 B. aphýlla N. Leafless; scape 15—30′, with few bracts; racemes long and loose; flowers purplish and yellowish-brown; lip 3-lobed. Swamps, S. August.

2 B. verecúnda H. K. Leaves all radical, broad-lanceolate; scape 2—3f; flowers purple, large and showy; lip broad and crisp at the end. Ga., Fla. July.

6. **CORALLORHÍZA,** Br. CORAL-ROOT. Sepals and petals subequal, converging. Lip produced behind into a spur, which is adnate to the ovary or obsolete. Pollinia 4. ♃ Plants leafless, brown, arising from coralline roots, sheathed with bracts. Flowers racemed. Fig. 000.

* Spur conspicuously prominent, but adnate. Lip 3-lobed.......... ....No. 1
* Spur wholly obliterated.—*x* Lip crenulate, wavy, not at all lobed............No. 2
—*x* Lip entire, slightly toothed near the base.....Nos. 3, 4

1 C. multiflòra N. Scape 10—15′, all brownish-purple, bearing 15—20 fls. in a long rac.; lip 3-lobed, white, spotted, 3—4″; caps. elliptical, pendulous. Woods, M., N. Jl.

2 C. odontorhìza N. Scape 9—14′, all brownish-purple, bearing 10—20 fls. in a long spike; lip undivided, oval, obtuse, spotted? caps. roundish, reflexed. Old woods. Jl.

3 C. innàta Br. Scape 5-10-flwd.; lip oblong, angularly 2-toothed toward the base, spotless, white; caps. elliptic-obovoid, reflexed. Damp woods, N.: rare. 5—8′. Jn.

4 C. Macræi Gr. Scape 15-20-flwd., fls. large; lip oval, obtuse, obscurely auriculate at base; caps. oval, 6″, reflexed; sepals and petals 6″. N. H., N. and W. 10—16′.

7. **APLÉCTRUM,** N. ADAM-AND-EVE. PUTTY-ROOT. Sepals and petals distinct, subequal, converging. Lip unguiculate, 3-lobed, middle lobe crenulate. Spur 0. Column free, anth. a little below the apex, pollinia 4, lens-shaped. ♃ Root a globous corm. Leaf 1, large, biennial. Scape after the leaf, bracted, racemed, and brown, as in Corallorhiza. Fig. 263.

A. hyemàle N.—Woods: rare. Corm near 1′ diam., a new one each year. Leaf elliptic-ovate, 3—5′, green all Winter. Scape 12—18′, with a dozen brownish flowers.

8. **ONCÍDIUM,** Sw. Lip expanded, lobed, tubercled at base. Perianth expanding. Sepals sometimes but 2. Column winged. Pollen masses 2, each 2-lobed. ♃ Splendid flowers, tropical, of easy culture in the greenhouse. Flowers large, in open racemes, olive, yellow, &c.

1 **O. flexuòsum.** Scape panicled, arising from the base of a bulb; leaves lanceolate; lip 2-lobed, spotted, much longer than the other petals. Brazil.

2 **O. lùridum.** Scape erect, branched; leaves elliptical; lip reniform, not longer than the wavy, retuse petals; flowers large, olive-colored. From S. America. 2f.

3 **O. Papílio,** has one spotted ovate leaf and large yellow-red butterfly-shaped flowers.

9. MICRÒSTYLIS, N. Sepals spreading, petals filiform or linear, lip concave, sessile. Column minute, with 2 teeth or lobes at tip. Pollinia 4. ♃ Root tuberous, with 1 or 2 leaves and small racemed flowers.

1 **M. ophioglossoìdes** N. St. 5—9′, with a single ovate (2′) leaf near the middle; rac. short (1′), ped. much longer than the minute whitish flowers. Woods, N. June.

2 **M. monophỳllus** Lindl. St. 2—6′, 3-angled, with a single ovate leaf; rac. elongated, 20-40-flowered; pedicels about as long as the flowers (2″). Woods, N.: rare. Jl.

10. LÌPPARIS, Rich. TWAY-BLADE. Sep. and pet. very narrow. Lip spreading, flat. Column winged. Pollinia 4, parallel with each other, without pedicels or glands. ♃ Root tuberous, with 2 lvs. and a rac. of greenish fls.

1 **L. lilifòlia** Rich. Scape about 6′; leaves 2, radical, lance-ovate, 3—4′; petals filiform, reflexed; lip purple, 6″, abruptly cuspidate; pedicels 1′. Damp woods. June.

2 **L. Lœsèlii** Rich. Scape 3—5′, about 6-flowered; pedicels 2″; lip 2″, oblong, mucronate, incurved, wavy; sepals and petals linear. Fields, Can. to Penn. June.

11. LÌSTERA, Br. TWAY-BLADE. Sep. and pet. subequal, lip pendulous, 2-lobed or 2-cleft. Column wingless, anth. dorsal, pollen powdery. ♃ Root fibrous. Stem (4—9′) with 2 opposite leaves above the middle. Flowers small, racemed. May—July, in damp woods.

1 **L. cordàta** Br. Lvs. roundish, subcordate, acute; fls. 10—15, in a short raceme; pedicels length of the ovary; lip-segment linear, length of the sepals. Penn., and N.

2 **L. austràlis** Lindl. Lvs. ovate; fls. in a loose raceme; ped. 3—4 times longer than the ovary; lip-segment linear-setaceous, twice the length of the sepals. N. J., and S.

3 **L. convallarioìdes** Hook. Lvs. round-oval; fls. few, loose, on slender pedicels; lip twice the length of the sepals (4″), 2-lobed at the dilated apex. Ga., and N.

12. SPIRÀNTHES, Rich. LADIES' TRESSES. Spike spiral. Perianth ringent, the 3 upper pieces ascending and connivent, lip oblong, recurved, channelled, the base embracing the column, and with 2 callous processes. Stigma ovate, beaked, 2-toothed at tip. Anthers dorsal, pollinia 2, each 2-lobed, powdery. ♃ Stem nearly naked, bearing many white flowers, bent to a horizontal position.

* Spike dense, with the flowers on all sides. Lvs. present with the flowers..Nos. 1—3
* Spike slender, flowers all in 1 straight or spiral row.—*x* Lvs. permanent....Nos. 4—6
—*x* Lvs. evanescent....Nos. 7, 8

1 **S. cèrnua** Rich. Leaves lance-linear, the upper bract-like; spike oblong to cylindric, 2—4′; lip very obtuse, crenulate-wavy, conduplicate and recurved; sepals and petals not connivent, 4—5″. Wet. 9—20′. Aug.—Oct.

2 **S. Romanzoviàna** Cham. Lvs. lance-oblong to linear; spike dense, 1—3′; lip much recurved, ovate-oblong, crenulate-wavy; sepals and petals all connivent above into a galea. Bogs, Me. (Miss Towle) to Lake Superior (Prof. Porter). July, Aug.

3 **S. latifòlia** Torr. Leaves nearly radical, 3-5-veined, lance-oblong; scape bracted, 4—8′; flowers small (2—3′); plant glabrous. Meadows, Penn., and N. June, July.

4 **S. odoràta** N. St. stout, 1—2f; lvs. lance-oblong; fls. yellowish, fragrant, 6″, in a spiral row, with leafy bracts; lip 2-toothed at base. Muddy streams, S. October.

5 **S. gramínea** Lindl. Lvs. below lance-linear to linear, the cauline mere sheaths; spike dense, much twisted; flowers white, 3—5″, pubescent, scarcely ringent; lip oblong-ovate, crisped, obtuse. Wet meadows. June—Aug. (S. tortilis C-B.)

6 **S. brevifòlia** Chapm. Lowest leaves elliptical, evanescent, cauline bract-like; flowers 5—15, in a nearly straight row, ringent, 3—4″; lip entire. S.

7 **S. grácilis** Bigel. Lvs. all radical, ovate to oblong, fugacious; scape very slender, 8—18′, with a few bracts; flowers 3—4″, in a nearly straight row, pure white; root fasciculate; plant glabrous. Woods: common. July, Aug.

8 **S. simplex** Gr. Lvs. all radical, fugacious; scape 5—9′, flowers very small (1—2″) in a thin 1-sided spike; lip obovate-oblong. Dry, N. J. (Porter), and S.

13. GOODYÉRA, Br. RATTLESNAKE PLANTAIN. Spike and perianth as in Spiranthes. Lip sessile, concave or sack-like or even spur-like at base, contracted at the end to a reflexed, channelled point. ♃ Root-stock creeping, branching. Leaves ovate, on sheathing petioles.

* Leaves radical, generally netted with white veins. Lip not spurred.......Nos. 1, 2
* Leaves cauline, uniformly green. Lip spurred at the base behind............No. 3

1 **G. Menzièsii** Lindl. Lip concave at base, gradually narrowed and folded at apex; leaves elliptic-ovate; scape 9—12′; spike loose-flowered; flowers pubescent (as are Nos. 2 and 3), *suberect*. Woods, N. Y. to Mich. (Dr. Leidy) and Oreg.! July, Aug.

2 **G. repens** Br. Lip saccate-inflated at base; leaves ovate, beautifully netted; scape 6—12′; flowers ovoid, *nodding*, in 1 row, which is more or less spiral; perianth greenish, about 2″ long and nearly as wide. Woods. June, July. (G. pubescens Br.)

3 **G. quercícola** Lindl. Rooting on the bark of Oaks, &c.; stem leafy; lvs. lance-ovate, thin; spike glabrous, dense, 6—20″; sheaths and bracts membranous; lip ovate at apex, the spur pouch-like, half as long as the ovary. Fla. to La. 6—12′.

14. PONTHIÉVA, Br. Lip on the upper or inner side, ovate, spreading, and with the other petals inserted into the middle of the column. Anthers with 4 pollinia. Otherwise like Spiranthes.

P. glandulòsa Br. Lvs. radical, oblong-oval; root fasciculate; scape 1f, bracted, with a spike of many greenish pubescent fls. Woods, S. Sept., Oct. (Cranichis N.)

15. CALOPÒGON, Br. GRASS PINK. Sepals and petals similar, distinct. Lip on the upper (inner) side (the ovary not twisted), unguiculate, bearded. Column free, winged at the summit. ♃ Corm bearing a grass-like leaf, and a scape with several showy flowers.

C. pulchéllus Br. Leaf linear, 8—12′ by 6″, veined; fls. 3—8, large, purple; lip spatulate, crested with colored hairs, erect over the column. Wet meadows. June, July.

16. POGÒNIA, Juss. Perianth irregular, its pieces distinct. Lip sessile or unguiculate, hooded, bearded inside. Column wingless, free. Anth. terminal, lid-form, with 2 pollinia. ♃

§ Sepals about equal, and similar to the petals, light purple. Lip scarcely lobed..Nos. 1, 2
§ Sepals much longer than, and unlike the petals, dark brown. Lip 3-lobed...Nos. 3, 4

1 **P. ophioglossoìdes** N. Root fibrous; stem 9—16′, with an oval-lanceolate leaf near the middle, and a leaf-like bract near the single large pale-purple flower; lip crested and fringed, as long as the sepals and petals. Swamps. June, July.

2 **P. péndula** Lindl. *Three-birds.* Root tuberous; stem 4—8′, with 4—8 small scattered leaves and 3 (1—4) drooping bird-like flowers 1′ long. Woods: rare. August.

3 **P. divaricàta** Br. Stem 1—2f, erect, with 2 linear-oblong lvs. and 1 terminal large flower; sepals linear, recurved at apex, 1½′ long; petals lanceolate, pink-colored, acuminate, 1′, lip a little longer. Swamps, Del. to Fla. April, May.

4 **P. verticillàta** N. Stem 8—12′, bracted at base, bearing 4 or 5 oval lvs. in a whorl at the top, with a curious flower; sepals linear, 2 or 3 times longer than the lanceolate, obtuse petals, which are about 9″ long. Swamps. June, July.

17. **ARETHÙSA,** Gron. Fl. ringent. Sep. and pet. similar, cohering at base and connivent above. Lip adnate to the column at base, recurved and dilated at apex. Anthers terminal, 2-celled, with 4 pollinia. ♃ Stem low, with sheathing bracts. Flowers purple, beautiful.

A. bulbòsa L. Flower single, 1—2′, erect, with 2 small bracts at its base; lip crenulate-wavy, bearded along the middle. Root a corm. Bogs. 6—12′. June.

18. **EPIDÉNDRUM**, Swtz. TREE ORCHIS. Sep. and pet. spreading. Lip united with the column forming a tube which is sometimes decurrent on the ovary. Anth. terminal, opercular, 4-celled. Pollinia 4. ♃ Grows on the rough bark of trees. Stems many-flowered.

E. conópseum H. K. Stems clustered, 5—8′, each with a pair of opposite, lance-linear, coriaceous leaves below, and 3—7 purplish fls. 6″ broad. Low lands, S. Aug.

ORDER CXXXVIII. SCITAMINEÆ. GINGERWORTS.

Tropical *herbs*. *Leaves* parallel-veined, with the veins diverging from the midvein. *Flowers* irregular and unsymmetrical, with *perianth* 3–6-parted and adherent to the 3-celled *ovary*. *Stamens* 3—6, some of them abortive. *Styles* united. *Fruit* dry or fleshy. *Seeds* albuminous. Here belong the Cinnamons, Gingers, Bananas, and Arrow-roots.

§ MUSACEÆ. Anthers 5, each 2-celled. Fruit many-seeded. Filaments 6...(*x*)
§ ZINGIBEREÆ. Anther 1, 2-celled. Filaments 3, not petaloid. Fruit ∞-seeded...(*y*)
§ MARANTEÆ. Anther 1, with 1 cell. Filaments 3, petaloid. Capsules 1-3-seeded...(*z*)
x Perianth of 2 unequal leaves or lips, the lower 5-toothed. Berry oblong..........MUSA. 1
x Perianth of 6 very unequal leaves, with large spathes. Fruit capsular............STRELITZIA. 2
y Perianth tube slender, lower petal lip-like. Stamens and style long-exserted. HEDYCHIUM. 3
y Perianth short, in spikes, with large bracts. Stamens and style included.....ALPINIA. 4
z Pistil petaloid, stigma 3-sided. Flowers inconspicuous. Leaves colored..........MARANTA. 5
z Pistil petaloid, stigma flat, linear. Flowers red, showy. Caps. 3-seeded..........CANNA. 6
z Pistil short, twisted, with a large gaping stigma. Fls. small. Caps. 1-seeded.... THALIA. 7

1. **MUSA** SAPIÉNTUM. BANANA. Scape 7—20f, sheathed below by the stalks of the majestic leaves, the summit a nodding spike of pink-colored flowers, becoming a huge cluster of delicious fruits in which the seeds are abortive.

2. **STRELÍTZIA** REGÌNÆ. Scape 5—8f, with sheathing bracts, upper bract spathe-like, horizontal, with a cluster of splendid flowers. Sepals lanceolate, 3—4′, yellow. Petals hastate, light blue, enclosing the stamens and style. S. Africa.

3. **HEDÝCHIUM** ANGUSTIFÒLIUM. Stem 5f, very leafy. Leaves linear-lanceolate. Sepals and pet. linear, the lip oblong, all scarlet, in a dense cluster. **H.** CARNEUM has similar leaves, with pink-colored flowers in a loose cluster. E. India.

4. **ALPÍNIA** MAGNÍFICA, from Mauritius, 10f high, has the flowers in a head with many large rose-colored bracts, which are bordered with a white line. **A.** NUTANS, still taller, from E. India, has a drooping raceme of pink-colored bracts and flowers, with curled and curved petals. Very splendid.

5. **MARÁNTA** BÍCOLOR, from Brazil, is cultivated for the large ovate leaves, which are beautifully feather-marked with light-green above and purple beneath

6. CANNA, L. Indian Shot. Sepals 3, persistent on the tubercled fruit. Petals 6, the innermost 2- or 3-lobed at the end. Stamen petaloid, with a half anther on one edge. Stigma petaloid, flat, obtuse. ♃ Handsome evergreen herbs, with tall stems and large smooth leaves.

§ Corythium. Corolla tube manifest. Petals dilated. Anther wholly adnate...No. 1
§ Canna *proper*. Cor. tube short or 0. Petals narrow. Anther free above..Nos. 2—4

1 C. fláccida Rosc. Stem 3—4f; lvs. lanceolate, 2f, pointed both ways; sep. erect, not ⅓ the length of the tube of the funnel-form corolla; petals and filaments obovate, thin, *flaccid*, wavy, yellow, spirally arranged; stig. spatulate. Ponds, South.

2 C. Indica. Stem 3—6f, leafy; lvs. ovate, pointed, 1—2f, abrupt at base; sep. green, 6″; 3 outer pet. erect, green-tipped, the 3 inner recurved or reflexed, the 5th double (2-lobed at end), the stamens and style similar (2′), all scarlet. W. Indies.

3 C. díscolor. Stem 6—10f; lvs. very large, green and purple; fls. in pairs, crimson.

4 C. iridiflòra. From Peru. Downy; sheaths colored at edge; fls. drooping, 3′, red.

7. THÀLIA, L. Flowers in a 2-leaved spathe. Cal. 3-sepalled, small. Cor. 6-parted, 3 inner pet. very unequal. Sta. 2-parted, the inner segment slender, bearing the ½ anther. Caps. thin. ♃ ≈ Scape sheathed at base by the petioles, tall, paniculate above. Flowers small, purple.

1 T. dealbàta Rosc. Plant 4f, covered with a white powder; lvs. cordate-ovate, on long petioles; panicles dense, erect, the branches as short as the lanceolate bracts. S.

2 T. divaricàta Chapm. Plant not powdery, 7f; lvs. lance-ovate, rounded at base; panicle open, divaricate, branches zigzag, much longer than the linear bracts. Fla.

ORDER CXXXIX. AMARYLLIDACEÆ. AMARYLLIDS.

Herbs perennial, chiefly bulbous, with linear *leaves* not scurfy nor woolly. *Flowers* showy, mostly regular and on scapes, with an adherent, 6-parted *perianth*. *Stamens* 6, *anthers* introrse. *Ovary* 3-celled, with *styles* united into 1. *Fruit* a 3-celled capsule or berry. *Seeds* 1 to ∞, with fleshy albumen. Figs. 58, 86, 486, 495.

§ Perianth crowned with a firm cup containing the stamens (§§ 78, 79)................Narcissus. 1
§ Perianth crowned with a thin membrane connecting the stamens....................Pancratium. 2
§ Perianth not crowned.—*a* Segments united into a tube above the ovary...(*b*)
—*a* Segments distinct down to the ovary...(*x*)
b Flowers in umbels or solitary on the naked scape...(*d*)
b Flowers in spikes, racemes, or panicles. Scape bracted...(*e*)
d Tube long and slender, segments narrow, abruptly spreading.........Crinum. 3
d Tube short or long, gradually expanding. Perianth subirregular............Amaryllis. 4
e Tube of the perianth straight. Stamens exserted........................Agave. 5
e Tube of the perianth curved. Stamens included ....Polyanthes. 6
x Perianth irregular. Stems leafy, flowers umbelled..........................Alstrœmeria. 7
x Perianth irregular. Scape naked, with 1 large flower..........................Sprekelia. 8
x Perianth regular.—*y* Sepals all white, larger than the petals..................Galanthus. 9
—*y* Sepals green-tipped, as large as the petals............Leucojum. 10
—*y* Sepals and petals equal, yellow.......................Hypoxis. 11

1. NARCÍSSUS, L. Perianth regular, 6-parted, bearing a bell- or cup-form crown on the throat. Sta. 6, inserted in the tube, and concealed within the crown. ♃ Stems bulbous, scapes bearing a long deciduous spathe with 1 or more yellow or white fragrant flowers. Leaves ensiform.

§ Crown longer than the tube of the perianth. Scape 1-flowered... ....Nos. 1, 2

§ Crown shorter than the tube,—*x* its border crenated. Flowers 1—5......Nos. 3—5
—*x* its border 6-lobed. Flowers 1—3...........No. 6
—*x* its border entire. Flowers 5—20 ....Nos. 7, 8

1 **N.** Pseudo-Narcíssus. *Daffodil.* Scape 2-edged, 1f; lvs. linear, 1f; fl. large, ylw.; crown bell-form, serrate-crenate, as long as the pet. Often double: com. Apr., May.

2 **N.** Bulbocòdium. *Hoop-petticoat.* Fl. ylw.; cr. much larger than perianth. Apr., May.

3 **N.** Jonquílla. *Jonquils.* Fls. 2—5, yellow, frag., small; crown saucer-shaped, much shorter than the petals; scape terete; lvs. half round, 1f. From Spain. May, June.

4 **N.** biflòrus. *Primrose-peerless.* Fls. generally 2, cream-wh., crown cup-shaped, ylw.

5 **N.** poéticus. *Poet's N.* Fl. 1, white, crown flattish, very small, pale-yellow, edged with crimson, throat yellow. Fl. often double. Scape 1f. Lvs. flat. June. S. Eur.

6 **N.** odòrus. *Great Jonquil.* Fl. mostly solitary, yellow, powerfully fragrant, crown bell-form, 6″, the lobes entire; limb 1′ long, tube slender, 9″. S. Europe. 1f. May.

7 **N.** Tazétta. Crown yellow, bell-form, half as long as the white or yellow petals, the border truncate; leaves glaucous, flat. Spain. May, June. Numerous varieties.

8 **N.** polyánthus. Crown white, thrice shorter than the ovate white petals, border nearly entire; leaves green, flat. Spain. Beautiful, but too tender north.

2. PANCRÀTIUM, L. Perianth tube produced above the (sessile) ovary, long and slender, the 6 segm. long and narrow. Stam. 6, adnate to the crown, exserted; anth. versatile. ♃ Bulb coated, scape solid, 2-edged, bearing a bracted umbel of large (white) flowers. (Leaves linear.)

§ Crown adnate below to the dilated throat and segment of the perianth ....Nos. 1, 2
§ Crown free, funnel-form, throat of perianth not dilated. Tube straight....Nos. 3, 4

1 **P. marítimum** L. Plant glaucous; lvs. longer than scape; tube 3—4′, longer than the lin.-lanceolate segm.; crown half-adherent, 12-toothed. Marshes, S. July—Sept.

2 **P. nutans** Gawl. Plant green; lvs. very long (2f); fls. nodding, with a green curved tube 2′, seg. nearly 3′; sta. incurved; crown slightly adherent. S. Car. (*Herbert.*)

3 **P. rotàtum** Gawl. Plant glaucous, 1—2f; lvs. long, strap-shaped, obtuse; tube 3′, green, shorter than the linear segments; crown irregularly toothed. S. April, May.

4 **P. coronàrium** Leconte. Plant green, 2f; lvs. lance-linear, obtuse; tube 3—4′, seg. as long; crown funnel-form, 1½′, jagged at edge; sta. 2½′. Wet or dry. South.

3. CRINUM, L. Flowers nearly as in Pancratium, but destitute of a crown. ♃ Bulb coated. Leaves in many rows. Scape solid.

1 **C. Americànum** L. Lvs. lin.-oblong; ova. sessile, 3—4 in the umbel; tube green and lance-lin., white segm. about equal (4′); caps. 1–6-seeded. Swamps, Fla., and W.

2 **C.** amábile. Bulb stem-like; lvs. broad-linear; scape flattened, 3—4f, bearing an umbel of 20—30 purple fragrant flowers 9′ long; pet. ligulate, recurved. E. India.

3 **C.** ornàtum. Bulb globular; lvs. undulate; scape 3f, 10–20-flowered; fls. white to roseate, very large; segments lance-oblong. E. India. Many varieties.

4. AMARÝLLIS, L. Perianth tube long or short, expanding upward; limb regular or nearly so. Sta. free, anth. versatile. Style long, declinate. ♃ Bulb coated. Leaves narrow. Scape 1–few-flowered.

1 **A. Atamásco** L. *Atamasco Lily.* Scape 1-flwd.; perianth bell-form, erect, 3′, pink-white; tube slender below, 1′; filaments included. An attractive flower, in wet clay soils, Va. to Fla. Scape terete, 6—12′. Lvs. linear, 1f. Mar.–May. (Zephyranthus Herb.)

2 **A.** vittàta. Per. 3—4′, nodding, white, red striped inside, margins crisped. S. Am.

3 **A.** regìnæ. Per. nodding, scarlet with a green star, throat fringed; fls. 2—4. S. Am.

4 **A.** speciòsa. Fls. 2—4, blood-red, erect, 3′ long, funnel-form. S. Afr. (Vallota, Hb.)

5. AGAVE, L. American Aloe. Perianth funnel-form, 6-parted. Sta.

6, exserted, anth. soon versatile. Caps. obtusely 3-angled, ∞-seeded. ♃ Monocarpic herbs (§ 42). Crown-root with thick fibres, a dense clump of thick, rigid, often spiny lvs. Scape bracted, with numerous flowers. July.

1 **A. Virgínica** L. Lvs. lin.-lanceolate, spine-pointed, denticulate; scape simple, 4–6f, loosely spicate above; fls. greenish-yellow, 1′, sessile, fragrant. Rocks, Va., and S.

2 **A.** AMERICÀNA. *Century Plant.* Lvs. glaucous, striped with cream-color in some varieties, lanceolate, spine-pointed and toothed, very thick and stout, 3—8f; scape produced but once, after 50—100 years, tree-like, with innumerable flowers. Mexico.

6. **POLYÁNTHES** (or Polianthes), L. TUBE-ROSE. Perianth funnel-form, with a curved tube. Fil. inserted into the throat, included. Ovary at the bottom of the tube, its summit free. ♃ Root an upright rhizome.

P. TUBERÒSA. Stem simple, slender, leafy-bracted, 3f, with a spike of rose-white flowers, 1½′, subregular, of exquisite fragrance. From Ceylon. Aug., Sept.

7. **ALSTRŒMÈRIA,** L. Perianth funnel-form, some irregular, of 6 leaves distinct to the ovary. Sta. diclinate. Stig. 3-cleft. ♃ Root a rhizome, bearing tubers. Stems leafy, umbellate at top.

1 **A.** PSITTACÌNA. Erect, 1—2f, with remote, lanceolate, sessile leaves; fls. 6—8, in a leafy cluster, pedicellate, 1¾′; segments spatulate, red, spotted with green. Brazil.

2 **A.** PELEGRÌNA. Lvs. sessile, lance-linear, twisted; fls. 2—6, pink-white, purp.-spotted.

3 **A.** VERSÍCOLOR. Perianth nearly regular, yellow, with purple spots. Chili.

8. **SPREKÈLIA,** Endl. JACOBÆA LILY. Perianth bilabiate, segments distinct to the ovary, the upper 3 spreading. Sta. epigynous, unequal, and with the style declinate, the ends incurved. ♃ Bulbous. Scape hollow, 1-flowered. Leaves linear, erect.

S. FORMOSÍSSIMA.—A splendid flower from S. America. Scape 1f. Flower dark red.

9. **GALÁNTHUS,** L. SNOW-DROP. Petals shorter than the sepals, notched or lobed. Sta. epigynous, erect, included, shorter than the straight style. ♃ Bulb coated, acrid. Scape 2-edged, solid. Flowers white, pendulous. Pods maturing under ground.

G. NIVÀLIS. Scape 6′, 2-leaved; flower 1, as white as snow, in early Spring. Europe.

10. **LEUCÒJUM,** L. SNOW-FLAKE. Sep. and pet. subequal, often thickened at apex. Sta. epigynous, included, and style erect. Stig. entire, obtuse. ♃ Bulb coated. Scape 2-edged, hollow. Flowers drooping.

1 **L.** VERNUM. Lvs. linear; scape 1–2-flwd.; sep. white, tipped with green or yellow, with divergent veins; spathe 1-leaved; seeds straw-color. March, April.

2 **L.** ÆSTÌVUM. Lvs. linear; scape 4–8-flwd., umbellate, 6—10′; sepals 6—8″, pure white with green tips; spathe 1-leaved; seeds black. May, June. Europe.

11. **HYPÓXIS,** L. STAR-GRASS. Spathe 2-leaved. Perianth regular, rotate. Seeds ∞, black. ♃ Small, bulbous, grass-like, with yellow flowers on filiform scapes. Meadows and copses.

1 **H. erécta** L. Hairy; scape about 4-flowered, shorter than the linear leaves, which are 3—5″ wide; flowers greenish without, yellow within. June.

2 **H. filifòlia** Ell. Smoothish; scape 2-flowered, shorter than the filiform leaves, which are not ½″ wide. Dry soils, S. Flowers rather larger (9—11″).

ORDER CXL. BROMELIACEÆ. BROMELIADS.

Herbs hard, dry, rigid, and often scurfy, with regular double *perianths*, nearly or quite free from the ovary. *Stamens* 6, *anthers* introrse. *Ovary* 3-celled. *Seeds* numerous, with mealy *albumen*. All tropical, and capable of living in air alone.

1. **TILLÁNDSIA**, L. Sepals 3, membranous, convolute. Pet. 3, petaloid, imbricate, spreading above. Sta. hypogynous. Ovary free. Caps. with 3 double cartilaginous valves. Seeds slender, on comous stipes. ♃ Scurfy air plants, with perennial 2-ranked narrow leaves.

* Stems rigidly erect. Lvs. linear-filiform. Fls. in bracted spikes, blue........Nos. 2—4

*1 **T. usneòides** L. *Long Moss.* Stems filiform, pendulous, branched; lvs. linear-filiform, curled, 1—2′; fls. solitary, green or gray. Low lands, Va., and S. Hangs in gray festoons from the branches of every tree. Used in upholstery.

2 **T. Bartrámii** Ell. Stems slender, 1f: lvs. shorter, smooth; spike branched, 3—4′, loose-flowered; pet. spreading at apex, as long as the bracts. Ga., Fla.

3 **T. cæspitòsa** Leconte. Stems in dense clusters, 3—6′; leaves scurfy, much longer, erect; spike 3- or 4-flowered, 1—2′; pet. recurved, longer than the bracts. E. Fla.

4 **T. recurvàta** Willd. Scapes filiform, 2-flowered, 6′; lvs. scurfy, recurved. E. Fla.

2. **ANANÁSSA** SATÌVA. PINEAPPLE. Raised in hothouses for its well-known fruit, which consists of a consolidated abortive flower-spike. From S. Am.

ORDER CXLI. HÆMODORACEÆ. BLOODWORTS.

Herbs perennial, with fibrous *roots*, equitant or rosulate *leaves*, and perfect *flowers*. *Perianth* regular, 6-parted, scurfy or woolly outside, more or less adherent. *Stamens* 6 or 3, and opposite the *petals*, *anthers* introrse. *Ovary* 3-celled, 1-styled. *Capsule* covered with the withered perianth. *Seeds* with cartilaginous albumen.

§ Ovary wholly adherent. Stamens 3, exserted. Perianth woolly outside....... ......LACNANTHES. 1
§ Ovary half free. Stamens 6, included.—*x* Corymbed perianths woolly all over........LOPHIOLA. 2
—*x* Racemed perianths rugous-scurfy..........ALETRIS. 3

1. **LACNÁNTHES**, Ell. RED-ROOT. Fls. woolly outside, oblong. Sep. linear. Sta. 3, and style filiform, exserted. Caps. ∞-seeded. ♃ Roots fibrous, red. Lvs. ensiform, equitant. Fls. in a dense corymb. July—Sept.

L. tinctòria Ell.—Swamps, R. I. to Fla. Stem strictly erect, 1½—2f; leaves mostly radical, 3—4″ wide by 9′, or more; flowers 4—5″, glabrous and yellow inside.

2. **LOPHÌOLA**, Ker. CREST-FLOWER. Fls. woolly outside and inside, oval. Sepals oblong. Sta. 6, glabrous, not exserted. Styles separable, conical with the 1 stigma. Seeds white. ♃ Root creeping. Stem flexuous, corymbous above, densely clothed with soft white wool. Jl., Aug.

L. aùrea Ker.—Sandy swamps, N. J. to Fla. Stem 1—2½f; leaves mostly radical shorter than the stem; flowers yellowish under the white wool, 2″. (Conostylis, Ph.)

3. **ALÈTRIS**, L. STAR-GRASS. COLIC-ROOT. Perianths rugous, as if scurfy or mealy, tubular, 6-cleft, arranged in a slender raceme. Styles

scarcely united. Ovary adherent at base only, opening at top, ∞-seeded. ♃ Smooth, intensely bitter. Leaves all radical, lin.-lanceolate. Jl., Aug.

1 **A. farinòsa** L. Lvs. rosulate, very acute, many-veined, 3—6′; scape 2—3f, simple; rac. about 9′; *fls. white*, 4—5″, on very short ped., oblong bell-form. Low grounds.

2 **A. aùrea** Walt. *Fls. yellow.* Otherwise scarcely diff. Both plants dry, yellowish.

ORDER CXLII. IRIDACEÆ. IRIDS.

Herbs with *corms, bulbs*, or *rhizomes*, equitant, 2-ranked *leaves* and spathaceous *bracts. Perianth* tube adherent to the *ovary. Segments* in 2 sets, often unequal and convolute in bud. *Stamens* 3, alternate with the *petals, anthers* extrorse. *Style* 1, *stigmas* 3, often petaloid. *Capsule* 3-valved, 3-celled, loculicidal. *Seeds* many, with hard, fleshy albumen. Figs. 85, 169, 170, 267–8, 282, 351.

§ Flowers irregular, somewhat bilabiate, nodding............GLADIOLUS. 8
§ Flowers regular and equilateral, mostly erect...(*)
  * Sepals similar to the petals in form, size, and position...(*a*)
    a Stamens monadelphous. Flowers small, blue. Plant grass-like............SISYRINCHIUM. 7
    a Stamens distinct.—*x* Flowers radical, with a very long tube................CROCUS. 6
      —*x* Flowers cauline. Style 3-parted at top................PARDANTHUS. 5
      —*x* Flowers cauline. Style 3-parted to base..............SCHIZOSTYLIS. 4
  * Sepals larger than the petals, and otherwise dissimilar...(*b*)
    b Stamens monadelphous. Petals spreading, panduriform...................TIGRIDIA. 3
    b Stamens distinct,—*z* stigmas slender, on a slender style.....................NEMASTYLIS. 2
      —*z* stigmas petaloid, on a very short style................ IRIS. 1

1. IRIS, L. FLOWER-DE-LUCE. Sepals 3, reflexed, larger than the 3 erect petals. Sta. distinct. Style short or 0. Stig. petaloid, covering the stamens. ♃ Mostly from tuberous, horizontal rhizomes, with ensiform leaves and large, showy flowers.

* Species growing wild, all (except Nos. 6, 7) in wet meadows or swamps. Apr.—Jn. (§)
  § Stems leafy, tall (1—3f). Tube short; sepals beardless and crestless...(*a*)
    a Leaves linear, grass-like. Ovary and pod 2-grooved on the sides.........No. 1
    a Leaves sword-shaped. Fls. blue. Sepals much larger than the petals...Nos. 2—4
    a Leaves sword-shaped. Fls. tawny or copper-colored. Petals reflexed...No. 5
  § Stems or scapes low (2—6′), nearly leafless. Tube long and slender...(*b*)
    b Sepals beardless and crestless. In hilly woods, southward...............No. 6
    b Sepals beardless, but crested with 3 longitudinal folds.................Nos. 7, 8
* Species cultivated for ornament, mostly from Europe...(*x*)
  x Sepals densely bearded.—*y* Stems very short, 1-flowered......................No. 9
    —*y* Stems tall, leafy, 1-5-flowered......... ... Nos. 10—13
  x Sepals beardless.—*z* Root a rhizome...Nos. 14, 15.—*z* Root bulbous....Nos. 16—18

1 **I. Virgínica** L. *Boston Iris.* Stem slender, 1—2f, branching; leaves 2—3″ wide; fls. 2—6, on slender ped.; sep. narrow, yellow, edged with purple. Mass. to N. J. Jn.

2 **I. versícolor** L. *Blue Flag.* Stem flexuous, 2—3f; pet. as long as the stigmas; ovary triangular, with concave sides and rounded angles. Common. June.

3 **I. hexágona** Walt. Lvs. longer than the flexuous stem; tube longer than the 6-sided ovary; sepals larger than the petals, blue-purple, crested. S., coastward.

4 **I. tripétala** Walt. Lvs. shorter than the slender stem; tube shorter than the 3-sided ovary; sepals many times larger than the petals. S.: rare. Purple.

5 **I. cùprea** Ph. Tall and flexuous, 2—3f; petals twice longer than the linear stigmas; capsules sharply 6-angled, shorter than the tube. S. and W. April—July

6 **I. verna** L. Scape 1-flowered, 3—5′, shorter than the rigid leaves; tube, sep., and pet. subequal (2′); stigmas deeply 2-cleft; fls. blue, with some yellow. Mar., Apr.

7 **I. cristàta** Ait. Scape compressed, and, with the lvs., 3—5′; tube longer than the sepals (2′), which are distinctly crested along the middle. Barrens, Va. to Ga. April.

8 **I. lacústris** N. Like No. 7, but the sep. are longer than the tube, &c. L. Huron.

9 **I.** PÙMILA. *Dwarf I.* Fls. large, blue-purple; pet. larger than sepals. In Spring. 3′.

10 **I.** GERMÁNICA. Flowers many, deep blue, the spathe also colored. Common.

11 **I.** SAMBUCÌNA. *Fleur-de-lis.* Flowers ∞, blue-white; segments notched. Common.

12 **I.** SUZIÀNA. Flower 1, very large, purple and spotted; petals reflexed.

13 **I.** FLORENTÌNA. *Orris-root.* With broad leaves and large white flowers.

14 **I.** GRAMÍNEA. Linear leaves much longer than the 1f, 2-flowered scape. Blue.

15 **I.** PSEUD-ÁCORUS. Flowers yellow; petals smaller than the stigmas, 3f. June.

16 **I.** XÍPHIUM. *Spanish I.* Lvs. subulate; 2 fls.; pet. narrow as stig. All colors. 1–2f.

17 **I.** XIPHIOÌDES. *English I.* Leaves subulate; fls. 2; petals broader than the stigmas.

18 **I.** PÉRSICA. *Persian I.* Lvs. linear; scape very short; petals smaller than the blue sepals.—All the above are hardy, except this, which is a house-plant.

2. **NEMÁSTYLIS,** N. No tube above the ovary. Sepals spreading, larger than the ascending, cucullate petals. Filam. shorter than the anth. Style enlarged above, and parted into 6 radiating, subulate stigmas. ♃ Bulb ovoid. Lvs. lance-linear. St. very slender, with 1 or 2 bright-blue fls.

N. cœlestìna N. Leaves very veiny, 1f; stem 15—20′, few-leaved; spathe 2-leaved; sepals obovate. 1′, ⅓ larger than the hooded petals. Swamps, Fla. to La.

3. **TIGRÍDIA,** L. TIGER-FLOWER. Spathe 2-leaved. Perianth regular, the 3 sepals larger than the 3 petals. Stamens monadelphous, filaments united into a long tube. ♃ Bulbous.

T. PAVÒNIA. St. simple, flexuous; leaves ensiform, veined; fls. inodorous, 5—6′ broad, ephemeral, several in succession, yellow, with crimson spots. Mexico.

4. **SCHIZÓSTYLIS** COCCÍNEA. Stem 3f. Leaves channelled, lance-linear. Flowers concave, regular, 2′ broad, in long spikes, crimson to scarlet, the styles slender and nearly distinct. Lately introduced from S. Africa.

5. **PARDÁNTHUS,** Ker. BLACKBERRY LILY. Sepals and pet. subequal, oblanceolate, spreading. Fil. slender. Style clavate, 3-parted, with 3 stigmas. Caps. oblong. Seeds black, attached to the column, and resembling a blackberry after the valves have fallen. ♃ Root a rhizome. Stem branching, leafy. July, August. (Ixia, L.)

P. Chinénsis Ker.—Leaves ensiform, as in Iris; flowers 1⅓′ broad, many, orange-yellow, crimson-spotted. Stems 3—4f. Escaped from cultivation.

6. **CROCUS,** L. Lvs. radical. Fls. nearly sessile on the bulb. Tube very long and slender, bearing the funnel-form perianth above the ground. Stigmas 3-cleft.

1 **C.** VERNUS. *Spring C.* Stigmas short, wedge-shaped; leaves linear. The beautiful flowers are white, blue, and variegated,—the earliest in the garden.

2 **C.** SUZIÀNUS, is golden yellow, with the 3 sepals revolute. Turkey.

3 **C.** SATÌVUS. *Saffron. Fall C.* Stigmas slender, reflexed; segments purple. Europe.

7. **SISYRÍNCHIUM,** L. BLUE-EYED GRASS. Spathe 2-leaved. Segments of the perianth flat, equal. Sta. monadelphous. Stig. 3-cleft. ♃

Grass-like plants, with compressed, winged or ancipital scapes, from fibrous roots. June, July.

S. Bermudiàna L. In tufts; lvs. linear, erect, about as long as the scapes; spathe 2–5-flowered, valves unequal; flowers small, blue; segments obovate, notched and mucronate; pedicels slender; pods globular, 8—12′.

α. ***anceps.*** Scapes winged, so as to resemble the leaves.

β. ***mucronàtum.*** Scapes barely 2-edged, filiform; spathe pointed.

8. **GLADIÒLUS**, L. Corn-flag. Spathe 2-leaved. Perianth irregular, 6-parted, somewhat 2-lipped. Stamens 3, distinct, ascending. Stig. 3, broader above. Seeds winged. ♃ A large genus of bulbous plants, chiefly from S. Africa. Fls. large and splendid. The species are badly confused.

1 **G.** psittacìnus. Spike 8–10-flowered; flowers scarlet and yellow, spotted, the tube as long as the segments. From this is derived many hybrids, as

β. Gandavénsis, variegated with orange, scarlet, and yellow. Common.

2 **G.** cardinàlis. Spikes few-flowered, the flowers crimson, with a white stripe in the lower 3 segments; stem branched above, 2f. Not hardy.

3 **G.** floribúndus. Flowers very large, nearly erect, upper segments broader, pink varying to white; spike long and crowded. Very delicate.

Order CXLIII. DIOSCOREACEÆ. Yam-roots.

Plants shrubby, twining, arising from tuberous rhizomes, with broad, net-veined *leaves*. *Flowers* diœcious, regular, hexandrous, *tube* adherent, *limb* 6-parted. *Ovary* 3-celled, 3–6-ovuled, 3-styled. ♂ *Stamens* 6, perigynous. *Fruit* a capsule, 3- or (by abortion) 1-celled, or a berry. *Seeds* compressed, albuminous.

DIOSCÒREA, L. Yam-root. Flowers ♂ ♀. Styles of the fertile 3. Cells of the caps. 2-seeded. Sds. membranaceously margined. ♄ Slender, twining with the sun. Lvs. simple, palmately-veined or divided. Flowers green, inconspicuous, in axillary spikes or panicles.

1 **D. villòsa** L. *Wild Yam.* Leaves broadly ovate, cordate, acuminate, 9–11-veined, the lower opposite or in 4's, upper alternate, petioles long, under surface downy, (never *villous*); stem slender, climbing 5—15f, over bushes, &c. June, July.

2 **D.** satìva. *Yam.* Leaves round-ovate, long-cuspidate, sinuate, cordate, all alternate, smooth; stems sometimes prickly. Root large and sweet. S.

Order CXLIV. SMILACEÆ. Sarsaparillas.

Herbs or *shrubs*, often climbing. *Leaves* reticulate-veined. *Flowers* diœcious. *Perianth* free from the ovary, 6-parted, regular. *Stamens* 6, inserted into the base of the segments. *Anthers* 1-celled (2-lamellate). *Ovary* 3-celled, cells 1- or 2-ovuled. *Style* 1 or none. *Stigmas* 3. *Berry* roundish. *Seeds* orthotropous, albuminous. Fig. 396.

SMÌLAX, L. Green-brier. Sarsaparilla. Character nearly as above. ♄ ♄ Lvs. palmately-veined, entire, petiolate, with a pair of stipular (§ 325, Fig. 396) tendrils. Flowers green or yellowish, small, in stalked, axillary umbels.

§ Herbs spineless. Lvs. and fœtid umbels long-stalked. Berries bluish..Nos. 12—14
§ Shrubby vines. Leaves short-stalked. Berries 1-3-seeded...(*a*)
a Pubescent, prostrate, spineless. Leaves cordate, evergreen. South.....No. 11
a Glabrous, climbing, and more or less prickly (except Nos. 5, 6)...(*b*)
b Lvs. acute at the base, 3-5-veined. Ped. shorter than the pet.....Nos. 8—10
b Leaves abrupt or cordate at base, 5-9-veined...(*c*)
c Leaves panduriform, or some hastate. Peduncles elongated..............No. 7
c Lvs. ovate or oblong, deciduous.—*x* Plants spineless..................Nos. 5, 6
—*x* Prickly.—*z* Leaves glaucous.........No. 4
—*z* Leaves green........Nos. 1—3

1 **S. rotundifòlia** L. *Common G.* Vine green, strong, and thorny, some 4-angled; leaves round-ovate, 5-7-veined, cusp.-pointed; ped. a little longer (6—7″) than the petioles; berries glaucous-black. Common in thickets. 10—30f. June, July.

2 **S. híspida** Muhl. Vine terete, hispid below, with weak, slender prickles, nearly unarmed above; leaves thin, deciduous, ovate, cuspidate; ped. twice as long (1′) as the petioles; berries black. Thickets, N. J., and N. 8—12f. June.

3 **S. Walteri** Ph. Vine unarmed, or prickly at base; lvs. cordate-ovate, 3-5-veined; ped. as long as the petioles; berries red, 1-3-seeded. N. J., and S. April—June.

4 **S. glauca** Walt. Vine more or less prickly above, angular; lvs. broad-ovate, glaucous at least beneath; ped. twice longer than the petiole; berries black, with a bloom; flowers yellowish white. Thickets, L. Isl. to Ga., W. to Ky. March—June.

5 **S. Pseudo-China** L. Root-stock tuberous; vine terete; leaves cordate-ovate to oblong, 5-veined; ped. flat, nearly as long as the lvs.; fr. black. N. J. to Ky., and S. Jn.

6 **S. sarsaparílla** L. Root-stock creeping, long; branchlets 4-angled; leaves thin, oblong-ovate; ped. flat, a little longer than the petioles; fruit *red*, 1-seeded. S-W.

7 **S. tamnoìdes** L. Vine terete; branches 4-angular, aculeate; leaves ovate-cordate to fiddle-form, and hastate, cusp.-pointed, rough-edged. N. J., W. and S.

8 **S. auriculàta** Walt. Vine prickly; branchlets angular, unarmed; leaves lance-auriculate-hastate, thick, small, smooth-edged, evergreen; berries finally black; flowers sweet-scented. S., near the coast. June. (S. maritima C-B.)

9 **S. laurifòlia** L. Vine prickly; branchlets unarmed, zigzag; leaves thick, evergreen, lance-oblong, obtuse, mucronate, 3-veined; fr. black, 1-seeded. N. J., and S.

10 **S. lanceolàta** L. Like No. 9, but the lvs. are thin, and berr. 3-seeded. Va., and S.

11 **S. pùmila** Walt. Lvs. shining above, soft-downy beneath; ped. as long as the petiole (6′); berries red, 1-3-seeded. Shady, rich soils, S. 1—3f. October.

12 **S. herbàcea** L. *Carrion-flower.* Stem erect or reclined, terete; leaves pubescent beneath, or nearly glaucous, ovate-oblong, 7-veined, with or without tendrils; ped. longer than the long petioles (3—4′), 8-20-flowered. Low grounds. 2—8f. June.

β. ***pedunculàris.*** Ped. very stout and long (6—8′), 30-50-flowered.

13 **S. lasioneùron** Hook. Vine climbing, glabrous; lvs. all with tendrils, cordate, ovate-oblong; ped. little longer than the petioles (3—4′). Thickets, W. 10f. June.

14 **S. tamnifòlia** Mx. Erect or climbing, glabrous; lvs. 5-veined, cordate-hastate, tapering to the obtuse apex; ped. longer than petioles; fr. blue-black. N. J., and S.

ORDER CXLV. ROXBURGHIACEÆ.

Herbs or *shrubby vines*, with many-veined netted *leaves* and perfect *flowers*. *Perianth* 4-parted, petaloid, persistent. *Stamens* 4, hypogynous. *Ovary* free, 1-celled. *Capsule* 2-valved. *Seeds* several, on hairy stalks, albuminous.

CROÒMIA, Torr. Fls. very small and few, axillary. Perianth seg. in pairs (2 sepals and 2 petals), oval. Ovules 4—6, suspended. Seeds 1—3. ♃ Rhizōme creeping. Leaves lance-ovate, cordate.

C. pauciflòra Torr.—Woods, Ga., Fla., Ala. Stem simple, 1f. Leaves about 6, thin, glabrous, pedately arranged, 7–9-veined. Ped. 1′. Flowers 2″ wide when open. April.

ORDER CXLVI. TRILLIACEÆ. TRILLIADS.

Herbs with simple *stems*, tuberous *roots*, and verticillate, net-veined *leaves*. *Flowers* terminal, 1 or few, perfect, mostly 3-parted. *Calyx* herbaceous, *corolla* more or less colored. *Stamens* 6—10. *Ovary* free, 3–5-celled, bearing in fruit a juicy, ∞-seeded pod. Figs. 115, 259, 294.

§ Leaves in one whorl. Sepals green, petals colored...TRILLIUM. 1
§ Leaves in two whorls. Sepals and petals alike greenish.......................................MEDEOLA. 2

1. **TRÍLLIUM**, L. WAKE-ROBIN. Perianth deeply 6-parted, in 2 distinct series, outer of 3 sepals, inner of 3 colored pet. Sta. 6, anth. longer than the filaments. Stig. sessile. Berry purple, 3-celled, ∞-seeded. ♃ St. simple. Leaves 3, whorled at the top of the stem, palmi-net-veined. Flowers solitary, terminal. In Spring.

§ Flowers sessile. Petals dark purple, erect......................................Nos. 1, 2
§ Flowers on a peduncle raised above the leaves...(*)
 * Leaves petiolate, ovate, rounded at the base. Petals thin, delicate....Nos. 3, 4
 * Leaves sessile, rhomboidal, nearly as broad as long. Petals thickish..Nos. 5, 6
§ Flowers on a peduncle deflexed beneath the leaves ....Nos. 7, 8

1 **T. séssile** L. Leaves sessile, roundish-ovate to rhomb-ovate, acute, mottled with dark purple; petals sessile, some spreading, dull purple. Pa., W. and S. 6—12′.

2 **T. recurvàtum** Beck. Lvs. ovate to obovate, narrowed to a petiole; sepals reflexed, green; pet. erect, narrowed at base to a claw, purple, 1′. Woods, W. 8—10′.

3 **T. nivàle** Rid. Stem 2—4′; lvs. oval to ovate, distinctly petiolate; fl. erect, 7—8″ long; petals ovate-spatulate, white, half longer than the sepals. Penn. to Wis.

4 **T. erythrocárpum** Mx. *Smiling W.* Lvs. ovate, rounded at base, acuminate; petals lance-ovate, recurved, twice longer than the sepals, wavy, white, beautifully pencilled at base with purple. Woods, Can. to Ga. 8—12′.

5 **T. grandiflòrum** Salisb. Lvs. rhomb-obovate, sessile, conspicuously acuminate; petals spatulate-obovate, much longer (1½—2′) than the sepals, white, varying to rose-color. Damp, rocky woods, M., S., and W. 8—12′.

6 **T. eréctum** L. *Bath Flower.* Leaves roundish-rhombic, short-pointed, almost petiolate, about as broad as long; ped. scarcely erect; flower nodding; petals oval-ovate, much broader than the sepals, dark purple, ill-scented. Woods.

β. album. Petals white or greenish; ped. inclined. N. Y. (Hankenson), and W.

7 **T. cérnuum** L. Leaves nearly as in No. 6; ped. more than half the length of the leaves, twice that of the flower; petals flat, not reflexed, white, little larger than the sepals; stigmas as long as the anthers. Woods, M., S., and W. 1—1½f.

8 **T. stylòsum** N. Leaves petiolate, ovate, oval, or elliptic; ped. not longer than the flower, decurved; petals recurved, much larger than the sepals, white; styles united, as long as the stigmas, shorter than the recurved anthers. South. 10—20′.

2. **MEDÈOLA**, Gronov. INDIAN CUCUMBER-ROOT. Perianth deeply parted into 6 petaloid, revolute segments. Sta. 6, with slender filaments. Stigmas 3, divaricate, united at base. Berry 3-celled, cells 3–6-seeded. ♃ Stem simple, arising from a white, tuberous rhizome (which is thought to resemble the cucumber in flavor) bearing 2 whorls of lvs. and 1—3 term. fls.

M. Virgínica L.—Damp woods. Slender, erect, 1—2f, with cottony wool. Lower whorl of 6—8, upper of 3 leaves. Flowers pendulous, yellowish. July. (Fig. 294.)

ORDER CXLVII. LILIACEÆ. LILYWORTS.

Herbs with bulbous or tuberous *stems*, parallel-veined, sessile *leaves*, and perfect, regular *flowers*, with the *perianth* uniformly colored and free from the *ovary*. *Stamens* 6 (4 in Majanthemum), perigynous. *Anthers* introrse (except in Uvularia). *Styles* wholly or partly united. *Fruit* a capsule or berry. *Seeds* albuminous.

§ LILIACEÆ *proper*. Style entire. Fruit a dry capsule. Plants with a scaly or coated bulb...(*)
§ ASPHODELEÆ. Style entire (or 0). Fr. a dry capsule. With a caudex, root-crown, or rhiz...(**)
§ CONVALLARINEÆ. Style entire. Fr. a colored berry. Plants with a rhiz. or fibrous roots...(***)
§ UVULARIEÆ. Style 3-cleft or 3-parted. Fruit a dry capsule. Plants with a rhizome...(****)
* Stem leafy above as well as at the base. Bulbs scaly...(*b*)
* Stem (scape) sheathed at base, leafless, many-flowered...(*c*)
* Stem (scape) sheathed at base,—*a* bearing a single nodding flower..............ERYTHRONIUM. 1
—*a* bearing a solitary, erect flower..............TULIPA. 2
b Petals equalling the sepals, with a honey-groove at base..............LILIUM. 3
b Petals equalling the sepals, with a roundish nectary at base..............FRITILLARIA. 4
b Petals much larger than sepals, nectary in the midst, or 0..............CALOCHORTUS. 5
c Perianth segments united, forming a tubular flower...(*e*)
c Perianth segments distinct, not forming a tube...(*d*)
d Flowers small, in a panicle of racemes, white..............NOLINA. 6
d Flowers in a simple raceme, mostly blue..............SCILLA. 7
d Flowers in a corymb, white, with bracts..............ORNITHOGALUM. 8
d Flowers in an umbel, white or roseate, with 2—4 bracts..............ALLIUM. 9
e Limb of the perianth revolute, as long as the tube..............HYACINTHUS. 10
e Limb of the perianth spreading, much shorter than tube..............MUSCARI. 11
** Perianth segments united more or less into a tube...(*m*)
** Perianth segments distinct.—*n* Flowers racemed, small, yellow..............SCHŒNOLIRION. 12
—*n* Flowers panicled, white..............YUCCA. 13
m Stamens straight, longer than the tubular, flame-colored perianth..............TRITOMA. 14
m Stamens all curved upward.—*o* Flowers in an umbel..............AGAPANTHUS. 15
—*o* Flowers cyanic, racemed..............FUNKIA. 16
—*o* Flowers xanthic, terminal..............HEMEROCALLIS. 17
*** Perianth segments separate, not forming a tube...(*s*)
*** Perianth segments united.—*v* Flowers greenish, axillary..............POLYGONATUM. 18
—*v* Flowers pure white, on a scape..............CONVALLARIA. 19
s Scape leafless, bearing an umbel. Berry blue, 2-celled..............CLINTONIA. 20
s Stem leafy, bearing the flowers solitary or in pairs. Berries red...(*y*)
s Stem leafy, bearing a white cluster.—*x* Flowers 6-parted..............SMILACINA. 21
—*x* Flowers 4-parted..............MAJANTHEMUM. 22
y Stems much branched, with filiform branchlets for leaves..............ASPARAGUS. 23
y Stem forking, with oval leaves.—*z* Fls. axillary. Berry ∞-seeded..............STREPTOPUS. 24
—*z* Fls. terminal. Berry 3–6-seeded..............PROSARTES. 25
**** Stem leafy. Flowers solitary, long, yellowish, drooping..............UVULARIA. 26

1. **ERYTHRÒNIUM**, L. Perianth campanulate. Seg. recurved, the 3 inner ones (petals) usually with a callous tooth attached to each side at base, and a groove in the middle. Style long. Caps. somewhat stipitate, seeds ovate. ♃ Lvs. 2, subradical. Scape 1 – ∞-flwd. Flowers nodding.

1 **E. Americànum** Sm. *Yellow E.* Bulb deep in the ground, sending up a scape which bears 2 unequal, lanceolate, mottled leaves at the surface of the ground, and a handsome drooping yellow flower at top. Woods. 3—5′. April, May.

β. ***bracteàtum.*** Leaves very unequal ; scape with a bract near the flower. Vt.

2 **E. álbidum** N. *White E.* Scape naked, bearing a white drooping flower ; petals without teeth, narrowed to the base. Wet meadows, N. Y. to Wis. May, June.

2. **TÙLIPA,** Tourn. TULIP. Perianth campanulate. Sta. short, subu-

late, anth. broad-linear, deeply emarginate at base. Style very short, stig. thick. Caps. oblong, triangular. ♃ Herbs acaulescent, with coated bulbs, sessile leaves, and a simple scape bearing a solitary, erect flower.

T. GESNERIÀNA. Plant smooth; leaves ovate-lanceolate, near the ground; segments very obtuse, endlessly variegated with red, yellow, and white. Persia. May, June.

3. **LÍLIUM**, L. LILY. Perianth bell-form, colored. Sep. 6, gradually spreading or recurved, each with a longitudinal honey-groove within from middle to base. Sta. shorter than the style, anth. versatile. Style clavate, stig. 3-lobed. Caps. subtriangular. Seeds 2-rowed in each cell. ♃ Bulbs scaly. Stems leafy. Flowers large, showy. June—August.

* Native wild Lilies, with yellow, orange, or red, spotted,—*x* nodding fls..Nos. 1—3
—*x* erect fls......Nos. 4, 5
* Exotic Lilies, cultivated, mostly hardy. Fls. nodding (except Nos. 6, 14)...(*a*)
a Stems bearing bulblets in the axils. Flowers orange-colored.........Nos. 6, 7
a Stems never bulbiferous.—*y* Fls. white. Lvs. lanceolate, scattered...Nos. 8—10
—*y* Fls. wh., varieg. and spotted, sweet....Nos. 11—13
—*y* Fls. yellow or straw-colored...........Nos. 14—16
—*y* Fls. red or purple.........................Nos. 17—19

1 **L. Canadense** L. *Yellow L.* Leaves mostly in whorls, lanceolate, the veins beneath hairy; ped. terminal, mostly in 3's; sepals gradually spreading, yellow to orange, with purple spots inside. Meadows, mostly N. 2—5f.

2 **L. supérbum** L. *Turk's-cap.* Leaves linear-lanceolate, acuminate, the lower whorled, upper scattered; flowers often numerous, orange to red, spotted, the sepals revolute. Wet soils. 4—6f. Flowers 3—30. Plant splendid.

3 **L. Caroliniànum** Mx. Lvs. 1-veined, oblanceolate, acuminate, tapering to the base, the upper whorled, the lower scattered; sepals lance-linear, recurved (not revolute), deep yellow spotted with purple. Swamps, S. 1½—3f. Flowers 1—3.

4 **L. Philadélphicum** L. Lvs. lance-linear, the upper whorled, lower scattered; fls. 1—3; sepals erect-spreading, lance-ovate, obtuse or barely acute, clawed, orange-red, spotted at base, 2½′ long. Dry pastures and copses. 15—20′.

5 **L. Catesbæi** Walt. Lvs. all scattered, lance-oblong to linear; flower solitary; sepals lanceolate, wavy, 3—4′, the long claws yellow, lamina and long, thickened acumination scarlet, spotted with purple. Damp barrens, Md., and S. 2—3f.

6 **L.** BULBÍFERUM. Fls. erect, rough inside, 2¼′; sep. sessile; lvs. 3-veined. 4f. Italy.

7 **L.** TIGRÌNUM. Fls. nodding, spotted; sep. sessile, 3½′, rev.; lvs. 5-veined. 6f. China.

8 **L.** CÁNDIDUM. Fls. campanulate, several, smooth inside. From Persia. 3—4f.

9 **L.** JAPÓNICUM. Fl. solitary, campanulate; sep. revolute at apex. Japan. 2—3f.

10 **L.** LONGIFLÒRUM. Fls. solitary, tubular-bell-form; sep. 5—6′. From Japan. 1f.

11 **L.** GIGÁNTEUM. Tall (8f); fls. spicate, trumpet-form, white, with carmine lines.

12 **L.** SPECIÒSUM. Stem 2—3f; leaves lance-ovate, scattered; fls. 1—3, fragrant; sepals 5′, revolute, white to roseate, with purple warty spots inside. Japan. Splendid.

13 **L.** AURÀTUM. Stem 1—2f; leaves lanceolate, scattered; fls. 1—3, fragrant; sepals 6—7′, spreading, white, with a yellow band and purple spots. Japan. "Glorious."

14 **L.** CRÒCEUM. Lvs. some in 3's, lin.-falcate; fls. erect, often umbellate, rough inside.

15 **L.** TESTÀCEUM. Lvs. whorled? lanceolate, many; fls. several, large, straw-col. 6f.

16 **L.** CÓLCHICUM. Lvs. crowded, lance-lin.; fls. sev., funnel-form; sep. recurved. 2f.

17 **L.** POMPÒNIUM. Lvs. lin. to subulate, crowded; fls. small, scarlet; sep. rough, revol.

18 **L.** MÁRTAGON. Lvs. lance-oblong, whorled; fls. panicled, purple to roseate, revolute, spotted. From Europe. 5f. [not spotted; sepals reflexed. Palestine. 3f.

19 **L.** CHALCEDÓNICUM. Lvs. lance-linear, crowded, erect, rough-edged; fls. bright red,

4. **FRITILLÀRIA**, Tourn. CHEQUERED LILY. Perianth campanu-

late, with a broad base and nectariferous cavity above the claw of each segment. Stamens as long as the petals. Stig. trifid. Caps. coriaceous, 3-celled, septifragal. ♃ With coated bulbs, simple, leafy stems, bearing 1 or more nodding flowers in Spring.

1 **F.** IMPERIÀLIS. *Crown Imperial.* Stem 3f, at base invested with long, narrow lvs., the middle naked, the summit bearing a raceme of large drooping red flowers beneath a crown of bracts. Var. FLAVA has yellow flowers. Persia.

2 **F.** MELEÀGRIS. *Chequered L.* Stem 1-flowered, with alternate, linear, channelled leaves; flower large, nodding, chequered with purple and yellow. Europe. 1f.

3 **F.** PÉRSICA. Fls. brownish-purple, in a pyramidal, naked raceme. Persia. 3f.

5. **CALOCHÓRTUS,** Ph. Perianth twisted in æstivation. Sepals 3, smaller than the 3 petals, which are bearded within except a central glabrous spot. Style very short, anth. recurved. Seeds 1-rowed in each cell of the capsule. ♃ Californian, bulbous. Leaves narrow. Stem erect.

C. SPLENDENS. Stem with 3—5 large, open, lilac flowers; pet. each with a brown-yellow eye in the middle. 1—2f. June.—A splendid flower, yet rare in cultivation.

C. PULCHÉLLUS and **C.** ALBUS, with the petals connivent into pendent globes, the one golden yellow, the other satin white, are very beautiful.

6. **NOLÌNA,** Rich. Perianth small, of 6 equal ovate spreading parts, longer than the 6 stamens. Stigmas 3, recurved, with a very short style. Caps. 3-winged, 3-(or 1–3-)seeded. ♃ Bulb coated. Scape widely branched. Flowers racemed, white, nearly bractless.

N. Georgiàna Mx.—Sand hills, S. Car. to Fla. Scape 2—3f, from a large bulb. Leaves long, narrow, all radical, recurved and channelled, rough-edged.

7. **SCILLA,** L. SQUILL. Sepals and petals similar, spreading (blue or purple). Filaments 6, slender, style thread-club-shaped. Caps. 3-angled, 3-celled, cells with 1 or several black seeds. ♃ Bulb coated, bearing several linear leaves and a scape with a raceme.

1 **S. esculénta** Ker. *Quamash.* Lvs. keeled, flaccid, shorter than the scape; bracts subulate, longer than the pedicels; filaments filiform; stigmas 3-toothed; sepals widely spreading, pale blue. Bottoms, W. 1—2f. May. (Camassia, Lindl.)

2 **S.** PERUVIÀNA. Leaves ciliate on the edges, longer than the scape; flowers stellate, in a dense conical corymb, violet-blue, rarely white. Spain.

8. **ORNITHÓGALUM,** L. STAR OF BETHLEHEM. Stem a coated bulb. Sep. and pet. similar, white, spreading, 3–7-veined. Fil. 6, subulate. Style slender, stigma 3-angled. Caps. roundish, 3-angled. Sds. few, black. ♃ Scape with a corymb of bracted flowers, and linear leaves.

O. umbellàtum L. Leaves channelled, as long as the scape (1f); flowers few, on long pedicels, the white sepals each with a green band outside. June. § Europe.

9. **ÁLLIUM,** L. GARLIC. ONION. Flowers in a dense umbel, with a membranous 2-(1–4-)leaved spathe. Perianth deeply 6-parted. Seg. mostly spreading, ovate, the 3 inner somewhat smaller. Ovary angular, stigma acute. Caps. 3-lobed. Seeds few, black. Strong-scented, bulbous plants. Leaves mostly radical.

§ Leaves (none at flowering-time) flat, lanceolate. Ovary only 3-ovuled.........No. 1
§ Leaves present, flat.—*a* Ovary 6-ovuled, often with a 6-toothed crest...(*y*)
—*a* Ovary ∞-ovuled, not crested. Leaves linear........No. 5
§ Leaves terete and hollow.—*x* Scape or stem slender, not inflated..........Nos. 8, 9
—*x* Scape inflated in the midst. Cultivated....Nos. 10, 11
y Wild native species. Leaves linear and very narrow..................Nos. 2—4
y Exotics cultivated. Leaves lance-linear or broadly linear..............Nos. 6, 7

1 **A. tricóccum** Ait. Lvs. 5—8′, fugacious, mostly gone in June, when the scape, with its rounded umbel of 10—12 white fls., appears. Woods, N. Eng. to N. C., and W. 1f.

2 **A. cérnuum** Roth. Lvs. very long; umbel *cernuous*, with 12—20 bright roseate fls.; sepals oblong-obovate, acute; filam. filiform, exserted. N. Y., W. and S. 1¼—2f. Jl.

β. ***stellàtum.*** Umbel mostly erect; stam. not exserted. Dry, Ill., and W. ¾—1½f.

3 **A. Canadénse** Kalm. Scape terete; leaves shorter than the scape; umbel erect, capitate, consisting of both (whitish) fls. and bulblets mixed. Shades. 1f. June.

4 **A. mutábile** Mx. Lvs. lin.-filiform, thin, shorter than the terete scape; umb. 20-40-flwd., erect; spathe 3-leaved, purplish; sep. ovate-lanceolate, longer than the sta., white or roseate; capsule 3-lobed, 3-seeded. Woods, S. 1—1½f. March—May.

5 **A. striàtum** Jacq. Lvs. linear, nearly equalling the teretish scape; spathe 2-lvd.; fls. 3—7, sep. lance-ovate, green-striped outside; not garlic-scented. W. and S. 8—12′.

6 **A.** SATÌVUM. *Common Garlic.* Bulb consisting of many small ones in a common sheath; stem leafy to the middle; umbel bulb-bearing; flowers white. Sicily. July.

7 **A.** PORRUM. *Leek.* St. compressed, sheathed at base by the channelled leaves; umb. globous, white; stamens a little longer than the rough-keeled sepals. Europe. July.

8 **A. vineàle** L. *Crow Garlic.* Stem and few fistulous lvs. very slender; umb. bulb-bearing; stamens alternately 3-cuspidate. Fields, June. It spoils the cows' milk.

9 **A. schænopràsum** L. *Cives.* Scape equalling the terete, filiform, fistulous lvs.; umb. capitate; sep. longer than the simple stamens, rose-purple. Lake shores, N. ‡

10 **A.** FISTULÒSUM. *Welsh Onion.* Scape inflated in the midst, not taller than the fistulous leaves; umbel dense, globular; stamens exserted. Asia. 18′. ‡

11 **A.** CEPA. *Common O.* Scape inflated near the base, much taller than the fistulous leaves. ② Universally cultivated, and of many varieties.

β. PROLÍFERUM. *Top O.* Umbel producing bulblets instead of flowers.

10. **HYACÍNTHUS,** L. HYACINTH. Perianth tubular-bell-form, segment spreading-recurved. Stam. straight, perigynous. Ovary free. Seeds few. ♃ Bulb coated. Scape racemous.

H. ORIENTÀLIS. Lvs. thick, lance-linear, half as long as the scape; flowers many, half 6-cleft, tumid at the base, blue, varying to purple, red, white, &c.; stamens deeply included. Levant. March, April. Fine for the bulb-glass.

11. **MUSCÀRI,** Tourn. GRAPE HYACINTH. Perianth-tube ventricous, ovoid, globular or urceolate, limb of 6 very short blunt teeth. Otherwise as in Hyacinthus.

1 **M. botryoìdes** L. Fls. scentless, globular, nodding, blue (&c.), 2″; lvs. broad-lin., obtuse, longer than the scapes (10′). Gardens and fields. May. § Europe.

2 **M.** MOSCHÀTUM. Fls. musk-scented, oval, nodding, 3″, greenish-blue, or livid, with a little 6-toothed crown in the throat; leaves lance-linear, *erect.* Europe. April.

3 **M.** RACEMÒSUM. Flowers fragrant, nodding, dense, ovoid-cylindric, blue with a white limb; leaves linear, flaccid, channelled, *recurved.* Rare in gardens.

4 **M.** COMÒSUM occurs in gardens as a monstrosity, with the tall (1f) raceme changed to a sterile, diffuse, feathery panicle of blue filaments. Showy.

12. **SCHŒNOLÍRION,** Torr. Stem a tuberous rhizome. Perianth

yellow, &c. Caps. obovoid, obscurely 3-lobed. Flowers racemed. ♃ Otherwise as in Ornithogalum, and too near it. April, May.

S. cròceum (Mx.) Lvs. narrowly linear, longer than the scape, which is very slender, 15—20′; flowers small, about 15 in the raceme, yellow; sepals ovate, 2″. Damp. S.

13. YUCCA, L. BEAR'S-GRASS. SPANISH DAGGERS. Perianth persistent and withering, of 6 sepals, the 6 stamens shorter. Stigmas 3, sessile. Caps. oblong, 6-sided, the 3 cells partly divided each into 2 by a false partition. Seeds ∞. ♃ Stem subterranean, or arising into a caudex (§ 227), with linear or sword-shaped perennial leaves and a terminal panicle of white, handsome flowers.

1 **Y. filamentòsa** L. *Bear's-thread.* Acaulescent or nearly so; leaves lance-linear, rigid, sharp-pointed, the margin *filamentous*, i. e., bearing thread-like fibres; scape 5—8f; flowers numerous, cup-form, 1¼′. Sands, S. June. †

2 **Y. gloriòsa** L. Caulescent; caudex some 3f; leaves clustered at top, lanceolate, stiff, margins very entire; flowers cup-form, very ∞. S. June, July.

3 **Y. aloefòlia** Walt. *Spanish Daggers.* Caudex some 10f, often branched, naked and scarred; leaves clustered at top, stout and sharp, serrulate; flowers white, with violet spots; sepals oblong. Thickets near the coast, S. June—Aug.

14. TRITÒMA, Ker. Perianth *tubular*, regular, 6-toothed. Stamens straight, hypogynous, alternately longer, and with the style exserted. Caps. ∞-seeded. ♃ Leaves linear, keeled. Scape racemed.

T. UVÀRIA. Lvs. in a dense radical crown; scape 3—5f, with a long raceme of innumerable soon-pendent, red, orange, and flame-colored flowers. S. Africa. Aug.—Oct.

15. AGAPÁNTHUS, L'Her. Perianth tubular at base, funnel-form, free from the ovary, regular. Stam. and filiform style upcurved at the end. Caps. 3-angled. Seeds ∞. ♃ Root tuberous. Leaves flat, linear. Scape bearing a 2-leaved umbel. Blue. July.

A. UMBELLÀTUS. Scape 2f, with the thick radical leaves as long; flowers many, large, the pedicels equalling the perianth. S. Africa. A fine parlor plant.

16. FÚNKIA, Spreng. Perianth funnel-form, deciduous. Stam. 6, hypogynous, and with the style declinate-curved. Caps. elongated, 3-angled. Seeds ∞, winged at end. ♃ Root fasciculate. Leaves all radical, ovate or oblong, veined, petiolate. Scape racemed. Japan.

1 **F.** SUBCORDÀTA. *White Day Lily.* Lvs. large, ovate, subcordate, veins strongly impressed; fls. white, fragrant, horizontal, 5′ long, tube longer than the limb. 2¼f. Aug.

2 **F.** OVÀTA Spr. *Blue Day Lily.* Lvs. broad-ovate, acuminate; rac. many-flowered; fls. funnel-form, 2′, blue or violet, nodding, tube shorter than the limb. Ohio, §. †

β. ALBO-MARGINÀTA. Has its leaves irregularly margined with white.

17. HEMEROCÁLLIS, L. DAY LILY. Perianth funnel-shaped, regular, ephemeral, limb spreading. Stam. 6, inserted in the throat, curved upward. Style slender, curved like the stamens and longer. Caps. with 3 few-seeded cells. ♃ Root fasciculate. Scapes branched. Leaves linear. Flowers large, xanthic, solitary, or racemed. July.

1 **H.** FULVA. Lvs. channelled; pet. obtuse, wavy; veins of sep. branched. An old garden plant, with large tawny flowers, lasting but a day. 3f. § Levant.

2 **H.** FLAVA. Lvs. channelled; sep. acute, bright yellow, veins undivided. Siberia. 1f.

18. POLYGONÀTUM, Tourn. TRUE SOLOMON'S SEAL. Perianth tubular, limb short, 6-lobed, erect. Stamens 6, inserted near and above the middle of the tube, and with the slender style included. Berry globular, black or blue, 3–6-seeded. ♃ Rhizome horizontal, thick. St. leafy above. (Lvs. alternate.) Fls. axillary, pendent, greenish-white. Fig. 258.

P. biflòrum Ell. Stem recurved, smooth; lvs. lanceolate to elliptic, sessile, obscurely many-veined, glaucous-pale and more or less pubescent beneath; filaments roughened, inserted near the middle of the tube. Woods. 1—3f. April—June.

β. ***gigánteum.*** Plant all smooth, tall; lvs. clasping; ped. 2–6-flwd. 3—7f.

γ. ***latifòlium.*** Plant pubescent above; leaves ovate, some stalked.

19. CONVALLÀRIA, L. LILY OF THE VALLEY. Perianth campanulate, of 6 united segments, lobes of the limb recurved. Stam. 6, included, perigynous. Ovary 3-celled, 1-styled, cells 4–6-ovuled. Berry (red) few-seeded. ♃ Rhizome creeping, slender. Lvs. radical, and scape very smooth, low, bearing a raceme of white, drooping, sweet-scented flowers.

C. majàlis L.—Mountain woods, Va. to Ga. Common in gardens. 6—10′. Lvs. ovate-elliptic, 2 or 3 with each scape. Flowers in an open raceme, 3—4″. May, June.

20. CLINTÒNIA, Raf. Perianth campanulate, of 6 equal, distinct segments. Stam. 6, hypogynous, anth. linear-oblong. Ovary oblong, 2-(rarely 3-)celled. Style elongated. Berry (blue) 2-celled, cells 2–10-seeded. ♃ Rhizome creeping. Lvs. few, broad. Scape naked, bearing an umbel.

1 **C. boreàlis** Raf. Lvs. broad-oval-lanceolate; flowers 2—5 in the bractless umbel, cernuous; berry-cells many-seeded. Mountainous or hilly woods. June. 8—13′. A smooth and elegant plant. (See Fig. No. 715 in the Class-Book.)

2 **C. umbellàta** Torr. Lvs. lance-oblong; umbel many-(12–30-)flwd., bracted; fls. white, speckled, 4—5″; berry-cells 2-seeded. Woods, W. N-Y., and S. along the mts.

21. SMILACÌNA, Desf. FALSE SOLOMON'S SEAL. Perianth of 6 equal, spreading segm., united at base. Stam. 6, slender, perigynous, anth. short. Ova. globous, 3-celled, with 2 ovules in each cell. Sty. short, thick. Berry globous, pulpy, 1–3-seeded. ♃ Rhizome creeping, thick or slender. Stem leafy, bearing a terminal cluster of white flowers in April—June.

§ Raceme compound. Stamens longer than the perianth. Ovules collateral......No. 1

§ Raceme simple. Stam. shorter than perianth. Ovules one above the other..Nos. 2, 3

1 **S. racemòsa** Desf. Stem recurved; leaves oval, strongly veined, acuminate, subsessile; raceme compound. Copses: common. Berries red-dotted. 2f.

2 **S. stellàta** Desf. St. erect; lvs. many, lanceolate, acute, amplexicaul; fls. few, in a simple raceme; berries dark red. Along rivers, N. and W. 10—20′.

3 **S. trifoliàta** Desf. Erect; lvs. 3 or 4, oval-lanceolate, tapering to both ends, amplexicaul; rac. terminal, simple; berries red. Mountain swamps, N. and W. 3—6′.

22. MAJÁNTHEMUM, Mœnch. TWO-LEAVED SOLOMON'S SEAL. Perianth of 4 ovate, obtuse, spreading segments, united at base. Stam. 4. Ovary 2-celled. Otherwise as in Smilacina.

M. bifòlium DC.—Common in open woods. Stem with 2 (rarely 3) ovate, subcordate leaves and a simple raceme of small white flowers, 3—6′. May.—In Oregon, the same plant becomes stout, 2f high, with petiolate, strongly cordate leaves!

23. ASPÁRAGUS, L. Perianth 6-parted, segm. erect, slight-spreading above. Sta. 6, perigynous. Sty. very short, stig. 3. Berry 3-celled, cells 2-seeded. ♃ Rts. fibrous, matted. Stems with filiform branchlets for leaves in the axils of scales.

A. officinàlis L. Stem herbaceous, very branching, erect; lvs. fasciculate; flowers axillary; berries red. Long cultivated, and § in rocky shores.

24. STRÉPTOPUS, Mx. TWIST-FOOT. Perianth bell-form, of 6 distinct, recurved sepals. Anth. longer than the filaments. Style elongated, stigmas 3-lobed. Berry globous, red, ∞-seeded. ♃ Stem fork-branched. Flowers axillary, solitary, on a *geniculate* or curved pedicel. June.

1 **S. ròseus** Mx. Lvs. oblong-ovate, clasping, margin finely ciliate; pedicels oftener merely recurved; anth. short, 2-horned at apex; stigma trifid. Damp woods, northward. 1f—15′. Flowers reddish, spotted, under the leaves.

2 **S. amplexifòlius** DC. Leaves oblong-ovate, strongly clasping, margin smooth and entire; pedicels abruptly bent in the middle; anthers and stigmas entire at the apex; sepals long-pointed, reflexed. Woods, Penn., and N. 2f.

25. PROSÁRTES, Don. Perianth as in Uvularia. Fil. 6, perigynous, included, much longer than the linear-oblong anth. Style elongated, trifid. Berry red, ovoid or oblong, 3–6-seeded. ♃ Stem erect, branched. Flowers few, greenish, terminal, drooping. May.

P. lanuginòsa Don. Lvs. ovate-oblong, pointed, clasping, downy beneath; pedicels in pairs; flowers spreading-bell-form; sep. 5—6″ long. Mountains, N. Y. to Car.

26. UVULÀRIA, L. BELLWORT. Perianth of 6 linear-oblong, connivent sepals, each nectariferous at base. Fila. much shorter than the long, linear, included anth. Style trifid. Caps. 3-celled, few-seeded. ♃ Stem forking. Leaves alternate. Flowers yellowish, drooping.

§ Leaves perfoliate near the base. Capsule obovoid-triangular, truncate....Nos. 1—3
§ Leaves sessile or half-clasping. Capsule ovoid or oval-triangular..........Nos. 4—6

1 **U. grandiflòra** Sm. Sepals acuminate, smooth within and without, greenish yellow, 1⅓′ long; anthers obtuse (¼′). Woods, 1—2f. May.

2 **U. perfoliàta** L. *Mealy B.* Sepals acute, 1¼′, twisted, covered inside with shining grains, pale yellow; anthers cuspidate. Woods. 10—14′. May.

3 **U. flava** Sm. Lvs. obtuse; sepals smooth both sides, yellow. 1′. N. J. to Va.

4 **U. sessilifolia** L. *Wild Oats.* Lvs. lance-oval, glaucous beneath; capsule stiped; style 3-cleft, nearly as long as the (9″) sepals. Glades: common. 6—10′. May.

5 **U. Floridàna** Chapm. Leaves oblong, glaucous beneath; style 3-cleft, half as long as the acuminate (8″) sepals. Woods, Fla. 4—6′. March.

6 **U. pubérula** Mx. Leaves puberulent, oval, green both sides; capsule sessile (no stipe); style 3-parted to near the base, not exceeding the anthers. Mountains, S

ORDER CXLVIII. MELANTHACEÆ. MELANTHS.

Herbs perennial, sometimes bulbous, often poisonous, with parallel-veined *leaves*. *Perianth* double, regular, persistent, of 6 consimilar, green or colored *segments*. *Stamens* 6, with extrorse *anthers*, 3 distinct *styles* or sessile *stigmas*, and a free, 3-celled *ovary*. *Capsule* 3-celled, 3-partible or septicidal, and *seeds* few or many, with a thin seed-coat.—Very near the Lilyworts, but the divided pistils afford a practical distinction.

§ Perianth 6-parted, tube very long, radical, like the Crocus..............................COLCHICUM. 1
§ Perianth 6-sepalled, wheel-form, on a scape or stem, with leaves...(*)
* Anthers 1-celled, extrorse, cordate, becoming peltate by opening...(*a*)
* Anthers 2-celled, extrorse. Capsule loculicidal. Flowers racemous...(*c*)
* Anthers 2-celled, introrse. Capsule septicidal. Flowers racemous...(*d*)
a Inflorescence racemous, with white flowers. Sta. scarce longer than sep...AMIANTHIUM. 2
a Inflorescence spicate, with green flowers. Sta. twice longer than sepals...SCHÆNOCAULON. 3
a Inflorescence paniculate, or a raceme somewhat branched at base...(*b*)
b Sepals glandular at base inside, clawed. Stamens perigynous..........MELANTHIUM. 4
b Sepals glandular at base inside, clawed. Stamens hypogynous ....ZIGADENUS. 5
b Sepals not gland-bearing. Stamens perigynous........................VERATRUM. 6
c Flowers perfect. Filaments dilated at base. Ovary cells 2-ovuled....... ..ZEROPHYLLUM. 7
c Flowers perfect. Filaments filiform. Ovary cells ∞-ovuled..............HELONIAS. 8
c Flowers diœcious, white. Stem leafy......................................CHAMÆLIRIUM. 9
d Stamens 6. Flowers greenish or yellowish, 9—40......................TOFIELDIA. 10
d Stamens 9—12. Flowers deep yellow, 6—9, mostly 6....................PLEEA. 11

1. **CÓLCHICUM** AUTUMNÀLE. A plant of curious habit, from Europe. The 1—3 long-(5-8′-)tubed, lilac-colored, 6-parted flower arises directly from the new tuber in the Autumn, followed in the succeeding Spring by a stem bearing the leaves and fruit.

2. **AMIÁNTHIUM,** Gray. FLY-POISON. Fls. ☿. Sep. sessile, spreading, glandless, shorter than the stamens. Anth. reniform. Caps. 3-horned, 3-partible into 1–4-seeded follicles. ♃ St. bulbous at base, scape-like. Lvs. grass-like. Fls. on slender pedicels, turning green with age. May—July.

1 **A. muscætóxicum** Gr. Bulb conspicuous; lvs. broad-linear, obtuse, many; rac. dense; sep. oblong; seeds ovate, red and fleshy. Shades, N. J., W. and S. 1—2f.

2 **A. angustifòlium** Gr. Tall, slender, scarcely bulbous; lvs. linear, acute; sepals oval, changing to brown; rac. very dense; seeds linear, dry. Damp woods, S. 2—3f.

3. **SCHÆNOCAÙLON,** Gray. Fls. ☿. Sep. green, linear-oblong, half as long as the hypogynous stam. Ova. 6–8-ovuled, carpels slightly cohering. ♃ Scape bulbous, rush-like. Lvs. sedge-like. Spike slender. Apr., May.

S. grácile Gr.—Sandy soils, Ga., Fla. Scape 2—3f, lvs. half as long. Fruit unknown.

4. **MELÁNTHIUM,** Gronov. Fls. ♂ ☿ ♀. Sep. spreading, unguiculate, with 2 glands at base, the claws bearing the short stamens. Ova. often abortive. Caps. 3-lobed, 3-pointed with the persistent styles. ♃ St. thickened at base. Racemes panicled. Flowers yellowish. July, Aug.

M. Virgínicum L.—Wet meadows, N. Y., W. and S. Stem 3—4f, leafy. Lvs. lanceolate to linear, 6″—2′ wide, subclasping. Flowers 8″, in a large panicle.

5. **ZIGADÈNUS,** Mx. ZIGADENE. Segm. colored, spreading, at base united, contracted and 2-glanded. Sta. hypogynous, nearly as long as the segm. Ovary adherent at base or free. Seeds ∞, scarcely winged. ♃ Smooth and glaucous. Leaves linear. Flowers greenish, panicled.

1 **Z. glabérrimus** Mx. Rhizome creeping; lvs. channelled, recurved; panicle conical; fls. 1′ broad; sepals lance-ovate, with 2 round glands. Swamps, S. 2f. June.

2 **Z. glaucus** N. Stem bulbous, nearly naked; lvs. flat, much shorter than the stem; sepals obtuse, 3″, each with 1 obcordate gland. Sandy shores, N. Y. to Dakota. 1½f.

3 **Z. leimanthoìdes** Gr. Root fibrous; lvs. flat; panicle slender; segm. obovate, the glandular spot obscure. Swamps, N. J., and S. 2—4f. Flowers white.

6. **VERÀTRUM,** Tourn. FALSE HELLEBORE. Fls. ♂ ☿ ♀. Sep. spreading, sessile and without glands. Sta. shorter than the perianth and inserted

on its base. Ovary 3, united at base, often abortive. Capsule 3-partible. Seeds few, flat, broadly winged. ♃ Flowers in panicles. July.

§ STENÁNTHIUM. Sepals at base united and adherent to base of ovary..........No. 1
§ VERÀTRUM *proper*. Sepals distinct to base and free from the ovary.......Nos. 2—4

1 **V. angustifòlium** Ph. Lvs. long-linear; stem slender, 2—4f; panicle 1½f, narrow; segm. green-white, subulate, 2″; flowers sessile, the upper fertile. Pa., W. and S.

2 **V. víride** Ait. Stem stout and very leafy, 2—4f; leaves lance-oval, ample, strongly plaited; flowers innumerable, green; sepals lanceolate, 6″. Wet meadows.

3 **V. parviflòrum** Mx. Leaves nearly all radical, oval-elliptic, petiolate, slightly plaited; stem slender, scape-like, long-paniculate; sepals spatulate-unguiculate, 2—3″, half as long as the pedicels, dingy green. S. 2—5f.

4 **V. Woodii** Robbins. Leaves lance-elliptic to lance-linear, the lower long-petioled, plicate; stem rather stout, 4—6f; panicle long and narrow; sepals oblanceolate to obovate, 4″, *almost black*, as long as the pedicels. Ind., and W.

7. **XEROPHỲLLUM,** Mx. Fls. ☿. Sep. oval, spreading, sessile, and without glands. Fila. dilated and contiguous at base. Styles linear, revolute. Caps. 3-lobed, cells 2-seeded. ♃ Lvs. numerous, dry, setaceous, the lower longer, rosulately reclined. Rac. simple, with white, showy flowers.

X. asphodeloìdes N.—Sandy plains, N. J. to N. C. 3—5f. Per. 5″ wide. Ped. 1″. Jn.

8. **HELÒNIAS**, L. Fls. ☿. Sep. sessile, spreading, glandless, shorter than the filiform stamens. Anth. blue. Caps. 3-horned, 3-styled. Seeds ∞, linear. ♃ Scape thickish, hollow, with many radical, narrow-oblanceolate leaves, and a short, dense raceme of purple flowers.

H. bullàta L.—N. J. to Va. Rare. 10—18′. Lvs. nearly as long as the scape. May.

9. **CHAMÆLÌRIUM,** Walt. Fls. ♂ ♀. Sepals linear-spatulate, persistent, white, shorter than the filiform stamens. Anthers yellow. Styles club-form. Caps. ovoid, entire. Seeds ∞, winged at each end. ♃ Root premorse. Stem strict. Racemes slender, dense, nodding at top.

C. lùteum (L.) *Blazing Star.*—Damp grounds. Apr.—Jn. 12—30′. Root lvs. lance-obovate, stem lvs. lanceolate, more on the taller ♀ plant. Racemes 3—12′. Spring.

10. **TOFIÈLDIA**, Hudson. Fls. ☿, 3-bracteolate at base. Sep. spreading, sessile, oblong. Caps. 3-lobed, 3-partible. Seeds ∞, oblong. ♃ Lvs. equitant, grass-like, from fibrous roots. Scapes clustered, bearing spikes or narrow, close, greenish racemes. June—August.

* Glabrous. Pedicels separate, very short. Rac. simple, short, spicate.....Nos. 1, 2
* Glandular. Pedicels in 3's (1's—4's), short. Bracteoles united...........Nos. 3, 4

1 **T. glutinòsa** N. Lvs. glabrous, linear-ensiform, ½ as long as the rough-*glutinous* stem; rac. short (1—1½′), spicate; sep. oblanc., 2″, pod 4″. Woods, O. to Wis. 15′.

2 **T. pubens** Dryand. Leaves nearly ½ the length of the glandular-puberulent stem; rac. of alternate, remotish fascicles, slender, 6—8′ long, 30-40-flowered; pod scarcely longer than the perianth. Barrens, Del. to Fla. Slender. 2—3f.

3 **T. palùstris** Huds. Lvs. 3-5-veined, acute; scape filiform; spike ovoid, lengthened in fruit; bractlets only at the base of the pedicels. Shores of L. Sup., and N.

4 **T. glabra** N. Leaves radical, a few on the stem; rac. 2—5′ long, dense, 20-30-flowered; bractlets united near the flower, as in Nos. 1 and 2. Barrens, S. 1—2f.

11. **PLEÈA,** L. C. Rich. Sep. wide-spread, lanceolate, sessile, longer

than the 9—12 stamens. Styles subulate. Capsules 3-lobed. Seeds ∞ bristle-pointed. ♃ Rush-like stem and leaves dry and rigid.

P. tenuifòlia Rich.—Bogs, S. 1—2f. Sept., Oct. Leaves perennial, erect, very narrow, 1f, and bracts sheathing. Rac. loose, of few light-yellow, star-like flowers (1′).

ORDER CXLIX. PONTEDERIACEÆ. PONTEDERIADS.

Plants aquatic, with the *leaves* parallel-veined, mostly dilated at base. *Flowers* spathaceous. *Perianth* tubular, colored, 6-parted, often irregular. *Stamens* 3 or 6, unequal, perigynous. *Ovary* free, 3-celled. *Style* 1. *Stigma* simple. *Capsule* 3-(sometimes 1-)celled, 3-valved, with loculicidal dehiscence. *Seeds* numerous (sometimes solitary), attached to a central axis. *Albumen* mealy.

* Flowers irregular, blue. Stamens 6. Utricle 1-seeded, (2 cells abortive)..........PONTEDERIA. 1
* Flowers regular,—x cyanic. Anthers 3, of 2 forms. Leaves reniform..............HETERANTHERA. 2
—x yellow. Anthers 3, of 1 form. Leaves linear..................SCHOLLERA. 3

1. **PONTEDÈRIA**, L. PICKEREL WEED. Perianth bilabiate, under side of the tube split with 3 longitudinal clefts (the 2 lower sepals free), circinate after flowering and persistent. Sta. unequally inserted, 3 near the base and 3 at the summit of the tube. Utricle 1-seeded. ♃ ♒ Leaves radical, long-petioled. Stem 1-leaved, bearing a spike of blue flowers. Jl.

1 **P. cordàta** L. Lvs. ovate to oblong-deltoid, cordate, with rounded lobes; petiole shorter than the peduncle; spike cylindrical, pubescent, 2′ long. In slow waters: com. A fine, showy plant, its blue spikes and smooth leaves 1—2f above the water.

2 **P. lancifòlia** Muhl. Lvs. lance-oblong to lance-lin.; fls. as above. S. Apr., May.

2. **HETERÁNTHERA**, R. & P. Tube of the perianth long and slender, limb 6-parted, equal. Stamens 3, lower anthers oblong-sagittate, on a longer filament. Capsule 3-celled, ∞-seeded. ♃ ♒ Leaves mostly reniform, long-petioled. July, August.

1 **H. renifórmis** R. &. P. St. prostrate or floating; lvs. roundish, reniform or auriculate at base; spathe acuminate, 3-5-flowered; flowers white. N. Y., Pa., and W.

2 **H. limòsa** Vahl. Leaves ovate-oblong, both ends obtuse; spathe 1-flowered, long-mucronate; flowers blue. S. and W. (Carruth). Lvs. 1—1½′, the stalks thrice longer.

3. **SCHÓLLERA**, Schreber. Tube of the perianth very long and slender, limb 6-parted, equal. Sta. 3, with similar anthers. Caps. 1-celled, ∞-seeded. ♃ ♒ Leaves sheathing at base, grass-like, submersed. Stem floating, rooting at the lower joints.

S. gramínea Willd.—A grass-like aquatic, in flowing water, N. 1—3f long. Leaves 1—2″ wide. Flower solitary, 2½′ long, spathe half as long. July, August.

ORDER CL. JUNCACEÆ. RUSHES.

Grass-like or rush-like *herbs*, with small, dry, greenish *flowers*. *Perianth* liliaceous in form, more or less glume-like, regular, 6-leaved, in 2 series, persistent. *Stamens* 6, rarely 3, hypogynous. *Anthers* 2-celled, introrse. *Style* 1. *Capsule* 3- or 1-celled, 3-valved. *Albumen* fleshy. Figs. 144, 467.

* Perianth yellow (greenish outside). Stigma 1. Capsule ∞-seeded....................NARTHECIUM. 1
* Perianth green or brownish. Stigmas 3.—*x* Capsule 3-seeded.......................LUZULA. 2
—*x* Capsule ∞-seeded.......................JUNCUS. 3

1. **NARTHÈCIUM,** Mœhr. Sepals spreading, yellowish inside. Fil. hairy. Caps. prismatic, 3-celled, tipped with the single style and stigma. Seeds ∞, bristle-tipped at each end. ♃ Root creeping. Lvs. linear, equitant. Scape bracted, simple, racemous. July, August.

N. ossífragum Huds.—Pine-barrens, N. J. Scape terete, 8—12′, the leaves much shorter. Sepals lance-linear, 2″. Pedicels 3—5″, bracteolate. Capsule yellowish, 4″. (N. Americanum Ker.)

2. **LÙZULA,** DC. WOOD RUSH. Perianth persistent, with 2 bractlets at base. Stamens 6. Capsule 1-celled, 3-seeded. ♃ Stem jointed, leafy. Lvs. grass-like, on entire sheaths. Fls. terminal, green or brownish.

* Flowers separate, pedicellate, in umbels or paniculate cymes..............Nos. 1, 2
* Flowers aggregate,—*x* in pedunculate heads forming an umbel or cyme...Nos. 3, 4
—*x* in sessile heads forming a nodding black spike ....No. 5

1 **L. pilòsa** Willd. Lvs. lance-linear, fringed with long white hairs; umbel simple, 12-20-flwd.; ped. 5—10″, soon deflexed; fls. 1″, brownish. Groves, Pa., and N. May.

2 **L. parviflòra** Desv. Taller; lvs. lance-linear, glabrous; umb. decompound; fls. nodding, small; sep. ½″; caps. dark brown, a little longer. Mts., N. 12—18′. Jn., Jl.

3 **L. campéstris** DC. *Field Rush.* Lvs. linear, flat, with cotton-like hairs; fls. in roundish heads, which are umbelled with very unequal peduncles; sep. rust-colored, longer than the obtuse caps.; seeds appendaged at base. Meadows. 3—12′. May.

β. ***bulbòsa.*** Bulbous at base, 3—9′; sep. shorter than the globular caps. Apr.

4 **L. arcuàta** E. Mayer. Lvs. linear, channelled, glabrous; hds. 3-5-flwd., on filiform, often recurved, unequal ped.; bracts ciliate; seeds not appendaged. White Mts.

5 **L. spicàta** DC. Lvs. linear, hairy at base, very short; spike oblong, 8—12″; sep. bristle-pointed, equalling the roundish, black capsule (½″). White Mts. 9—12′. Jl.

3. **JUNCUS,** L. RUSH. Stamens 6 or 3. Capsule 3-celled, or (by the dissepiments not reaching the centre) 1-celled. Seeds numerous. ♃ Mostly glabrous. Stems simple, leafless, or with terete or grassy leaves, entire sheaths, and small, 2-bracteolate, green or brown fls. June—Aug.

§ Clusters growing apparently from the side of the simple scape ..(*)
§ Clusters terminal on the stem or scape. Leaves never knotted...(**)
§ Clusters terminal. Flowers in heads. Leaves internally knotted...(***)
* Leaves few, radical, knotless, terete like the scape.........................Nos. 1, 2
* Leaves none. Flowers separate, not in heads.—*a* Stamens 3..............No. 3
—*a* Stamens 6.........Nos. 4—6
** Flowers separate, not in heads. Stamens 6...(*c*)
** Flowers capitate, few or many in each head.—*b* Stamens 6............Nos. 7, 8
—*b* Stamens 3...........Nos. 9, 10
c Stems branched. Pod much shorter than the unequal sepals..............No. 11
c Stems simple.—*d* Pod globular, not exserted. Flowers green.......Nos. 12, 13
—*d* Pod oblong or ovoid, exserted, brown..............Nos. 14—16
*** Seeds tailed. Panicle rather erect, longer than its bract...........Nos. 17—19
*** Seeds acute, not tailed.—*x* Stamens 6...(*y*)
—*x* Stamens 3, bracts shorter than panicle...(*z*)
y Heads 2-8-flwd. (or 1-flwd. in No. 20). Bracts shorter than panicle...Nos. 20, 21
y Heads 5-70-flowered. Leaf or bract overtopping the panicle........Nos. 22, 23

z Heads 5-15-flowered, and numerous, in April—June.............Nos. 24, 25
z Heads 20-80-flowered, few and large..................................Nos. 26, 27

1 **J. setàceus** Rostk. Scape weak, slender, (not *setaceous*), 1—2f; lvs. shorter; panicle small, 20-30-flwd., flowers separate; sepals very acute, pod globous. Sea-coast, S.

2 **J. Rœmeriànus** Scheele. Scape stout, rigid, 2—4f, and leaves pungent; panicle compound; flowers capitate; sep. sharp-pointed; pod turgid, a little shorter; heads 5-8-flowered, dark brown. Marshes, Va. to Fla. (J. maritimus C-B.)

3 **J. effùsus** L. *Soft R.* Scapes straight, not rigid; panicle decompound, often diffuse; flowers green, sep. as long as the obovoid, obtuse pod. Wet: common. 2—3f.

4 **J. filifórmis** L. Scapes very slender, weak, the subsimple panicle near the middle; sepals longer than the obtuse, mucronate pod. Me. to Mich. 1—2f.

5 **J. Smíthii** Engelm. Scapes slender, rather rigid, 2—3f; cyme few-flwd.; flowers brown, 1″; pod round-ovoid, mucronate, exserted. Broad Mountain, Pa. (Porter).

6 **J. Bálticus** Dethard. Scapes in dense rows on the rhizome, rigid, pungent; pan. near the top, brown; sep. erect, very acute, equalling the elliptical, mucronate pod (1½″). Sandy shores, Me. to Penn. and Wis. 1—3f.

7 **J. trífidus** L. Stems tufted, 5—8′, wiry, sheathed at base, 3-leaved at top, and with a sessile head of 3 blackish flowers; capsule globular. Mountains, N. H., N. Y.

8 **J. Stýgius** L. Stems few-leaved at base, leafless at top, 7—12′; heads 1—3, about 3-flowered; sepals shorter than the elliptic pod; seeds large, tailed. Me., N. Y.

9 **J. repens** Mx. Stems low, tufted, 2—6′; leaves linear, opposite, fascicled; sepals subulate, awn-pointed, 3—4″, the slender pod 2″. ① Md. to Fla. May.

10 **J. marginàtus** Rostk. Stem compressed; leaves linear, flat; cyme compound; heads many, 2-9-flowered, chestnut-brown; pod globular. 1—3f.

β. ***biflòrus.*** Heads very numerous, 2—3-flowered, nearly black. S.

11 **J. bufònius** L. *Toad R.* Slender, 3—8′, tufted; leaves 1—2′; branches 2, flower bearing the whole length; flowers remote, green; the 3 outer sep. longer. Common.

12 **J. tenuis** Willd. Stems wiry, 8—24′; leaves flat-filiform, 3—8′; bracts longer than the loose panicle; sepals green, longer than the roundish pod. Common.

β. ***secúndus.*** Flowers 1-rowed on the branchlets; bracts shorter than the panicle.

13 **J. dichótomus** Ell. Stem wiry, 1—2f; lvs. terete-filiform, channelled, on long sheaths; panicle forked or dense; pod roundish, long as sepals. S. Too near No. 12.

14 **J. Gerárdi** Loisel. *Black Grass.* Sts. wiry, leafy, 1—2f; lvs. thread-ensiform, 3—8′; pan. longer than the bracts; *style conspicuous;* pod blackish, long as sepals. Marshes.

15 **J. Greénii** Oakes & Tuckm. Wiry scapes and filiform lvs. rigid; bract filiform, twice longer (4′) than the small panicle; flowers secund, straw-brown; sepals ovate, shorter than the ovoid pod. Coasts of N. Eng. and Mich. 1—2f.

16 **J. Vaseyi** Engelm. Sepals lanceolate, as long as the oval pod; bract scarcely longer than the panicle. Otherwise like No. 15. Mich. (Prof. Porter).

17 **J. asper** Engelm. Sts. rigid, 2—3f; lvs. rigid and *rough*, 3—10′; hds. scattered, 3-5 flwd., sep. 2½″, strongly veined, subequal! shorter than the pointed brown pod. N. J

18 **J. caudàtus** Chapm. Sts. rigid, 2—3f; lvs. 3, rigid, erect; panicle large, erect, hds. 2-4-flwd.; sep. 2″, unequal; pod 3″, finally black; sds. with long white tails. S.

19 **J. Canadénsis** Gay. Sts. terete, with 2 or 3 erect, smooth lvs.; fls. in Aug. and Sept., 3—50 in a head, paniculate, brownish; sepals lanceolate, 3 outer shorter, none longer than the oblong-triangular pod; stamens 3. Common and very variable.

a. ***coarctàtus.*** Heads 2-5-flwd., in a contracted panicle; pod brown, exserted.

β. ***brachycéphalus.*** Hds. 3-5-flwd., in a spreading panicle; pod brown, exserted.

γ. ***subcaudàtus.*** Slender; heads 8-20-flwd., remote; seeds with short white tails.

δ. ***longicaudàtus.*** Stouter; hds. 8-50-flwd., approximate; sds. slender, long-tailed.

20 **J. pelocárpus** Meyr. Sts. slender, 2-3-lvd., 10—20′; panicle much branched; fls. in pairs or solitary, scattered, reddish; pod oblong, pointed with the slender style, longer than the oblong sepals. Wis. to Me. and Fla. (J. Conradi Tuckm.)

21 **J. articulàtus** L. Stems 1f, with 1—2 leaves; heads 3-8-flowered, crowded in a spreading panicle; sepals brownish, oblong; pod deep brown, oblong, exserted N

β. ***obtusàta.*** Heads 5-flowered; sepals and pod green, obtuse, mucronate. Phila

γ. ***insignis.*** Panicle erect, few-flowered; outer sepals cuspidate, inner obtuse.

22 **J. militàris** Bw. *Bayonet R.* Stem stout, 2—3f, bearing a single terete leaf near the middle, which overtops the panicle; heads 5–15-flowered; sepals brownish, acute, as long as the acuminate capsule. Bogs, coastward, N. Eng. to Del.

23 **J. nodòsus** L. Stem slender, 2- or 3-lvd.; lvs. slender, the upper (bracts) overtopping the cluster; heads few (1—9), approximate, 5–50-flowered; sepals brown, lance-subulate, shorter than the beaked capsule. Wet sands, Can. to Car.

β. ***megacéphalus.*** Stout, 3f, upper leaf and bract exceeding the simple cluster; heads 50–80-flowered, green; outer sepals subulate-awned, as long as the pod.

24 **J. acuminàtus** Mx. Stems 2- or 3-leaved; hds. 3–15-flowered, in a loose spreading panicle exceeding the bract; sepals lance-subulate, nearly equalling the short-pointed brown pod; seeds minute, acute at both ends. May, June.

β. ***débilis.*** Slender or stout; hds. 3–7-flwd.; pod exserted. N. J., Ky., and S. 9′–3f.

γ. ***legítimus.*** Heads 8–15-flowered; pods scarcely exserted. (J. Pondii C-B.)

25 **J. Elliòttii** Chapm. Stem, leaves, and panicle very erect, 1—2f; hds. 5–8-flwd., fls. 1″; sepals lanceolate, as long as the turgid-ovoid, blackish pod; seeds acute. April.

26 **J. brachycàrpus** Eng. Strict, rigid, 1½—2½f; leaves 2—3; bract short; hds. round, dense, 50-flwd., pale, few (2—10); 3 outer sepals awned, much longer than pod. W.

β.? ***Wolfii.*** Pan. spreading; *pod ovoid, blunt*, little shorter than the sep. Ill. (Wolf).

27 **J. scirpoìdes** Lam. Rigid, 2f; heads and bract as in the last; style usually exserted; sepals pungent-awned, equalling the taper-pointed pod. N. Y. to Ga.

β. ***polycéphalus.*** Stout, 3f; heads 60–90-flwd., brownish, distant; lvs. flattened.

ORDER CLI. COMMELYNACEÆ. SPIDERWORTS.

Herbs with flat, narrow *leaves*, sheathing at base. *Sepals* 3, green, *petals* 3, colored. *Stamens* 6, some of them usually deformed or abortive. *Styles* and *stigmas* united into one. *Capsule* 2- or 3-valved. *Seeds* 3 or more.

§ Flowers irregular, clustered in a spathe-like, cordate, floral leaf........................COMMELYNA. 1
§ Flowers regular, clustered. Floral leaves like the rest. Stamens 6..................TRADESCANTIA. 2
§ Flowers regular, solitary, axillary. Stamens 3. Moss-like herbs...........................MAYACA. 3

1. COMMELÝNA, Dill. Fls. irregular, 3 of the stamens sterile, with glands for anthers. Caps. 3-celled, one of the cells abortive or 1-seeded.—Leaves contracted to the sheathing base. Floral leaf or spathe erect in flower, recurved before and after. Petals blue, open but a few hours.

1 **C. commùnis** L. Procumbent and much branched; lvs. lance-ovate, rounded at base; spathe lateral, 2–6-flowered; odd petal reniform. Wet soils, S. June—Nov.

2 **C. Cayennénsis** Rich. Procumbent, glabrous, with small (1½—2½′) ovate-oblong, obtuse leaves; spathe lateral, 3–4-flowered; odd petal round-ovate. Banks, Ill. to La.

3 **C. Virgínica** L. Stem weak, ascending; lvs. lanceolate to linear; spathe broad-cordate when open; odd petal very small, raised on a claw. Dry. M., S., W. Jl., Aug.

4 **C. erécta** L. Erect, pubescent, sheaths hairy; leaves lanceolate; spathe hawk-bill-shaped, its base-lobes united; petals nearly equal. Woods, Pa., W. and S. Jl., Aug.

2. TRADESCÁNTIA, L. SPIDERWORT. Fls. regular. Sep. persistent, pet. large, roundish, spreading. Fil. clothed with jointed hairs, anth. reniform. Caps. 3-celled. ♃ Fls. in terminal, close umbels. Juice viscid.

1 **T. Virgínica** L. Umbels sessile, terminal and axillary, with leafy bracts; ped. soon reflexed; flowers ephemeral, of a rich deep blue; leaves linear, channelled; stem thick, jointed, 2—3f. Damp. M., S., W. Cultivated.

2 T. pilòsa Lehm. Umbels sessile, terminal and axillary; leaves lanceolate, hairy both sides; flowers small, bluish purple. Banks, Ill. to O., and S. 2f.

3 T. ròsea Mx. Umbels terminal, *pedunculate*, with subulate bracts; leaves linear; petals rose-colored, twice longer than the smooth calyx. May. 1f.

4 T. CRASSIFÒLIA. From Mexico, a trailing leaf-plant, in vases and baskets, with thick ovate leaves, variegated with purple, green, and white. Flowers roseate.

3. MAYÀCA, Aubl. Stamens 3, opposite the sepals. Caps. 1-celled. Seeds several, attached to the middle of the valves. ≋ Moss-like, creeping, branching, beset with narrow, linear leaves. Peduncles solitary, axillary, 1-flowered. Resembles a Sphagnum.

M. Michaùxii Schott. & Endl. Ped. longer than the lvs. (which are 2—3″), reflexed in fruit; pod 9–12-seeded; petals white. Shallow waters, Va. to Fla. July.

ORDER CLII. XYRIDACEÆ. XYRIDS.

Herbs sedge-like, with equitant *leaves* and a scape bearing a head of regular triandrous *flowers*. *Perianth* of 3 glumaceous *sepals* and 3 colored *petals*. *Fertile stamens* on the claws of the petals. *Style* 3-cleft. *Capsule* 3-valved, ∞-seeded.

XYRIS, L. YELLOW-EYED GRASS. Head of flowers ovoid-cylindrical, invested with an armor of cartilaginous scales. One sepal membranous, involving the yellow corolla in bud, the 2 lateral strongly keeled, persistent. Pet. crenulate, on claws, caducous. 3 sterile sta. alternately with the 3 fertile. ♃ Lvs. radical, linear, sheathing the base of the slender scape. Jn.–Aug.

* Scape 2-edged above (except No. 6). Lvs. long, linear, flat, often twisted...(*x*)
* Scape teretish, its lvs. shorter than its sheath (No. 9) or longer, and filiform...No. 8
  x Sepals exceeding the bract, and fringed on the winged keel...........Nos. 6, 7
  x Sepals (the 2 lateral) included,—*y* winged and ciliate on the keel......Nos. 3—5
  —*y* wingless or very nearly so...........Nos. 1, 2

1 X. flexuòsa Muhl. *Common X.* Scape 6—18′, often bulbous at base; lvs. narrowly linear, 3—9′, often twisted; head round-ovoid, 3—4″; sepals minutely bearded at the tip, lance-oblong, quite wingless on the keel. N. Eng. to Ill. and Ga.

2 X. ambígua Beyr. Scape 2—3f; lvs. broad-linear, rough-edged, 6—12′; hd. lance-oblong, 9—15″; sepals lanceolate, slightly winged; petals large (6″). Barrens, S.

3 X. Caroliniàna Walt. Scape 1—2½f, the broad-linear lvs. more than half as long; hd. yellowish-brown, 6—9″; sep. obscurely fringed; pet. 4—5″. Swamps, Mass. to Fla.

4 X. Ellióttii Chapm. Scape 2-edged throughout, 1—1½f; lvs. narrow-lin., ½ as long; hd. obovoid, 4—5″; sep. cut-fringed on the wing; pet. 3″. Wet barrens, S. Car. to Fla.

5 X. platýlepis Chapm. Scape 2—3f, twisted, as well as the broad-linear lvs.; hd. 9—18″, pale; sepals fringed at the apex, wing narrow; petals 2—3″. Sands, S. Car. to Fla.

6 X. torta Sm. Bulbous; terete scape and rigid lvs. twisted; hd. oval to oblong, 5—9″; sepal fringe exserted; petals large, roundish, 8″. Sand, N. J. to Fla. (X. bulbosa K.)

7 X. fimbriàta Ell. Scape rough, 2—3f, the broad-linear lvs. nearly as long; hd. large, ovoid, 9—12″; sepals much fringed and exserted; petals small (3—4″). N. J. to Fla.

8 X. Baldwiniàna R. & S. Scape 6—18′, twice longer than the filiform bristle-pointed leaves; head oval, 2—4″; sep. falcate, keel winged, ciliolate. Fla. (X. filifolia Ch.)

9 X. brevifòlia Mx. Scape 4—12′; lvs. linear to subulate, ½—2′, spreading two ways; head oval, 2—3″; sep. wingless; pet. 2″. Wet places, S. (X. flabelliformis Chapm.)

ORDER CLIII. ERIOCAULONACEÆ. PIPEWORTS.

Herbs perennial, aquatic, with linear, cellular, spongy *leaves* sheathing the base of the slender *scapes*, which bear a dense head of minute imperfect *flowers* at top. *Perianth* 2–6-parted or 0. *Stamens* 6, some of them generally abortive. *Ovary* 2- or 3-celled, cells 1-seeded.

* Stamens (4 or 6) twice as many as the petals. (Scape 7–12-ribbed)..................ERIOCAULON. 1
* Stamens 3, as many as the petals. (Scape 5-ribbed, puberulent)....................PÆPALANTHUS. 2
* Stamens 3, and no petals. Scape 5-ribbed, short, hairy..........................LACHNOCAULON. 3

1. **ERIOCAÙLON,** L. PIPEWORT. Fls. ☿, in a compact head, with an involucre, the marginal fertile. Sepals 3. ♂ Petals 2 or 3, black-tipped, united, sta. 4 or 6. ♀ Pet. 2 or 3, distinct, sta. 0. Style 1, stigmas 2 or 3. ♃ Lvs. grass-like. Scape fluted. Chaff and fls. white-woolly at tip. Jn.–Aug.

1 **E. decangulàre** L. Scape tall (2—3f), 10-12-ribbed; leaves linear-ensiform, suberect, near ½ as long as the scapes; head 3—5″; chaff pointed. Swamps, Va. to Fla.

2 **E. gnaphaloìdes** Mx. Scape tall (1—2½f), 10-ribbed; leaves ensiform-subulate, 2—4′; bracts and chaff obtuse, densely white-fringed. Swamps, N. J. to Fla.

3 **E. septangulàre** Wth. Scape very slender, 7-ribbed, 3—6′, or in water several feet according to its depth; leaves linear-setaceous, 1—3′; heads globular. N. J. to Mich.

2. **PÆPALÁNTHUS,** Mart. Flowers 3-parted. Stamens in the sterile flowers 3. Stigmas in the fertile flowers 3. Capsule 3-seeded. Otherwise nearly as in Eriocaulon.

P. flàvidus Kunth. In tufts; scapes 5-ribbed, minutely downy, 6—9′; leaves linear setaceous, 1—2′; head finally globular, bracts obtuse, straw-colored. Va. to Fla.

3. **LACHNOCAÙLON,** Kunth. ♂ Calyx 3-sepalled. Cor. 0. Sta. 3, anth. 1-celled, filaments united below. ♀ Cal. 3-sepalled. Cor. reduced to a tuft of hairs surrounding the 3-seeded caps. Otherwise as in Eriocaulon.

L. Michaùxii K. Scapes 1—5′, clustered, 5-ribbed, villous, 2—8′ (1f, Chapman); lvs. ensiform-subulate, 1—2′; head globular, 1—2″, brownish. Sands, Va. to Fla.

CLASS IV. GLUMIFERÆ,

Or GLUMACEOUS ENDOGENS. Plants having their flowers invested with one or more alternate imbricated glumes (chaff or husk) instead of petals and sepals, and collected into spikelets, spikes, or heads. The Class is equivalent to

COHORT 7. GRAMINOIDEÆ, the GRAMINOIDS or grass-like plants.

ORDER CLIV. CYPERACEÆ. THE SEDGES.

These are grass-like or rush-like *herbs*, with fibrous *roots* and solid *culms*. *Leaves* generally 3-ranked, linear, channelled, based on entire or tubular *sheaths*. *Flowers* spiked, perfect or imperfect, one in the axil of each glume. *Perianth* none, or represented by a few hypogynous bristles called *setæ*, or a cup-shaped or bottle-shaped *perigynium*. *Stamens* definite, generally 3 (1—12). *Anthers* fixed by their base, 2-celled. *Ovary* 1-celled, 1-ovuled. *Style* 2- or 3-cleft and the *achenium* 2-sided or 3-sided.

The Sedges abound in marshes, meadows, and swamps. They are extremely difficult to determine, owing to their general similarity of form and appearance and the minuteness of their flowers. They are, therefore, the last to be studied in the botanical course. The scope and plan of this work exclude the details of this Order, and the pupil who may be interested in it is referred to the full account of its genera and species contained in the Class-Book.

By a careful observation of the annexed table, our Sedges may all be readily traced to their Genera, which are comparatively few.

§ CYPEREÆ. Glumes distychous (2-rowed). Flowers all perfect...(*)
§ SCIRPEÆ. Glumes imbricated all around, each (except sometimes the lowest) with a perfect flower. Spikes all terminal or all lateral...(**)
§ RHYNCHOSPOREÆ. Glumes imbricated all around or irregularly, the lowest empty. Spikelets both terminal and axillary (except Dichromena)...(***)
§ CARICEÆ. Glumes imbricated all around, or irregularly. Flowers monœcious or diœcious. Achenium enclosed in a bottle-shaped *perigynium*...(****)

* Inflorescence axillary. Perigynium or perianth of 6—10 setæ......................Dulichium. 1
* Inflorescence terminal, Perigynium none.—*a* Spikes 2 - ∞ - flowered ....Cyperus. 2
—*a* Spikes 1-flowered, capitate...........Kyllingia. 3
** Perianth of 3 ovate clawed petals and (often) of 3 setæ. Glumes awned.............Fuirena. 4
** Perianth of 2 oblong sessile scales (pales) and no setæ. Spikes ∞......... .....Lipocarpha. 5
** Perianth of 1 minute double scale and no setæ. Spikes 2, lateral.................Hemicarpha. 6
** Perianth of setæ only, 3 — ∞. No scales or petals...(*b*)
** Perianth none at all...(*d*)
b Achenium crowned with a tubercle. Spike solitary, terminal ....Eleocharis. 7
b Achenium not tubercled.—*c* Setæ 3—6, short, or else tawny. *Bog Rush*............Scirpus. 8
—*c* Setæ ∞ (—6), long, cottony, white or reddish....Eriophorum. 9
d Style 2-cleft. Spikes 5—10, terminal (capitate in Gen. 13)......................Fimbristylis. 10
d Style 3-cleft. Achenium 3-angled ....Trichelostylis. 11
*** Achenia crowned with the persistent style or its bulbous base (a tubercle)...(*s*)
*** Achenia not tuberculate,—*x* brown like the scales. Setæ none......................Cladium. 16
—*x* white or whitish, crustaceous. Setæ none.............Scleria. 17
s Perianth none (no setæ).—*y* Spikes diffusely cymous.......................Psilocarya. 12
—*y* Spikes capitate. Bracts colored...........Dichromena. 13
s Perianth of setæ.—*z* Achenium tuberculate with the base of the style..Rhynchospora. 14
—*z* Achenium horned with the entire long style.....Ceratoschœnus. 15
**** Spikes either with ♂ and ♀, or each wholly ♂ or wholly ♀ ....Carex 18

Order CLV. GRAMINEÆ. The Grasses.

Herbs (the Canes and Bamboos are woody and tree-like) with culms mostly hollow and jointed. The *leaves* are alternate, 2-ranked, on tubular sheaths split down to the base, and bearing a membranous *ligule* (of the nature of stipules) where the sheath and blade meet. *Flowers* in little spikelets of 1 or several, with the glumes in 2 rows, collected into spikes, racemes, or panicles. *Glumes* (the lower pair of scales in the spikelet) alternate, enclosing the flowers. *Pales* (or palæ, the outer pair of scales of each particular flower) alternate and unequal. *Perianth* 0 or represented by 2 minute hypogynous scales. *Stamens* 1—6, commonly 3, *anthers* versatile, 2-celled, bifid at both ends. *Ovary* simple, 1-ovuled, 1-styled, with 2 feathery *stigmas*. *Fruit* a caryopsis, with mealy *albumen*.

A vast and important Order, contributing largely to the sustenance of man and beast. Both herbage and seed are rich in sweet and nutritious matter. In temperate regions, the Grasses form a *turf*, soft, green, and compact, clothing the hills and plains, pastures and meadows. But in tropical regions this beautiful turf-carpet is unknown, the Grasses becoming larger, even trees (as the stately Bamboo), and stand more isolated, with broader leaves and larger panicles. To this Order belong the Cereal Grains, as the *Indian-Corn*, *Wheat*, *Rye*, *Oats*, *Barley*, *Rice*, &c., as well as the Hay-grasses—*Timothy*, *Red-top*, *Blue-grass*, *Spear-grass*, &c. Also the *Sugar-Cane*, and various kinds of Sorghum.

As a study, the Grasses are usually neglected by beginners, and for the same reasons mentioned under the preceding Order, but ultimately they become of absorbing interest. We fear that any account of the entire Order growing within our territory, such as could be compressed within our limited space, would prove unsatisfactory to the beginner. We therefore content ourselves by annexing a modified analytical table of the Genera, and referring the learner to the full account of the Genera and Species contained in the Class-Book—noticing a few ornamental genera recently introduced.

§ Spikelet 1-flowered with no apparent rudiment of a second flower...(2)
§ Spikelet 2-flowered, one of the flowers sterile or rudimentary...(7)
§ Spikelet 3-flowered, the two lower (lateral) flowers sterile or rudimentary...(*i*)..................Tribe 6
§ Spikelet 2 – ∞ - flowered, two or more of the flowers perfect, or all imperfect (♀ ♂)...(9)
2 Inflorescence paniculate...(3)
2 Inflorescence strictly spicate, spikes equilateral...(5)
2 Inflorescence strictly spicate, spikes unilateral...(6)
3 Glumes none (or minute and the stamens 6)...(*a*)..................................Tribe 1
3 Glumes present, at least 1 conspicuous...(4)
4 Pales of the flower thin and soft, often awned...(*b*)..................................Tribe 2
4 Pales of the flower coriaceous,—* tipped with awns...(*f*)..........................Tribe 4
—* awnless...(*g*)..................................Tribe 5
5 Spikes cylindric, the spikelets condensed all around...(*e*)..................................Tribe 3
5 Spikes prismatic, spikelets sessile in rows...(*v*)..................................Tribe 9
6 Spikelets rounded on the back, appressed to the rachis...(*g*)..........................Tribe 5
6 Spikelets acutely keeled on the back, imbricated on each other...(*x*) } ....Tribe 10
7 Upper fls. of the spikelet abortive.—* Fls. in unilateral spikes...(*x*)..... }
—* Flowers paniculate...(*k*)..................................Tribe 7
7 Lower flower of the spikelet abortive...(8)
8 Pales coriaceous, firmer in texture than the glumes. Paniculate...(*g*)................Tribe 5
8 Pales membranous, thinner than the glumes. Spicate...(*bb*)..........................Tribe 11
9 Flowers in 2- or 4-rowed,—* equilateral spikes...(*v*)..................................Tribe 9
—* unilateral spikes...(*x*)..................................Tribe 10
9 Flowers in panicles more or less diffuse...(10)
10 Pale awned at the tip or awnless...(*n*)..................................Tribe 8
10 Pale awned on the back or below the tip...(*k*)..................................Tribe 7

1. ORYZEÆ. (*Spikelets* 1-*flowered, panicled. Glumes obsolete. Stamens* 1—6.)
a Flowers perfect, flattened laterally, awnless.—Glumes 0. Stam. 2 or 3. *Cut Grass*....LEERSIA. 1
—Glumes minute. Stamens 6. *Rice*.......ORYZA. 2
a Flowers monœcious, both kinds in the same panicle. Stamens 6. *Indian Rice*.........ZIZANIA. 3
a Flowers monœcious, each kind in separate panicles. Stamens 5—12. S..............LUZIOLA. 4

2. AGROSTIDEÆ. (*Spikelets* 1-*flowered, panicled. Glumes and pales thin. Grain free.*)
b Flowers surrounded at base with a tuft of long, silky hairs....................CALAMAGROSTIS. 10
b Flowers naked or thinly bearded at base...(*c*)
c Glumes both long-awned and longer than the awned pales...................... POLYPOGON. 9
c Glumes both awn-pointed (or minute and the pale awned)....................MUHLENBERGIA. 8
c Glumes awnless, conspicuous...(*d*)
d Pale stalked in the glumes, awned on the back, monandrous. *Sweet Reed*.......CINNA. 7
d Pale sess. in the glumes, 3-androus,—acute, awnless. Glumes shorter.... SPOROBOLUS. 6
—obtuse, often awned on back. *Bent G*..AGROSTIS. 5

3. PHLEOIDEÆ.—*e* Glumes united at base, awnless. Pale 1, awned..................Alopecurus. 11
—*e* Glumes distinct, mucronate. Pales 2, awnless. *Timothy*............Phleum. 12
—*e* Glumes distinct, pointless. Pales 2, awnless..........................Crypsis. 13
4. STIPACEÆ.—*f* Awn of the flower simple, straight, deciduous......................Oryzopsis. 16
—*f* Awn of the flower simple, twisted, very long..............................Stipa. 15
—*f* Awn of the flower triple or 3-parted. *Poverty Grass*....................Aristida. 14
5. PANICEÆ. (*Spikelets 2-flwd., lower flower abortive. Glumes very unequal. ☿ Pale coriaceous.*)
g Spikelet apparently 1-flowered, the lower glume wanting and the single abortive pale supplying its place.—Flowers spicate, unilateral ....Paspalum. 17
—Flowers diffusely panicled, all alike. *Millet Grass*... ....Millium. 18
—Flowers paniculate, 2 sorts, one under ground.........Amphicarpum. 19
g Spikelet evidently 2-flowered, both glumes present, abortive flower neutral or ♂ ...(*h*)
h Flowers paniculate,—without awns or spines. Pale cartilaginous. *Panic G.*....Panicum. 20
—without awns or spines. Pales herbaceous............Penicillaria. 21
—with the glumes and pale coarsely awned. *Cock-spur*....Oplismenus. 22
h Flowers spike-panicled,—each with an invol. of awned pedicels. *Fox-tail*........Setaria. 23
—each with a hardened, burr-like invol. *Burr Grass*...Cenchrus. 24
6. PHALARIDEÆ.—*i* Sterile flowers 2 minute rudiments. Panicle spicate..............Phalaris. 25
—*i* Sterile flowers 2 awned pales. Panicle spicate..............Anthoxanthum. 26
—*i* Sterile flowers both 2-valved, ♂. Panicle open................Hierochloa. 27
7. AVENEÆ. (*Spikelets 2 - ∞ -flowered, panicled. Glumes large. Pale awned below the tip.*)
k Spikelet with 1 perfect flower and 1 awned staminate flower—above. *Soft Grass*.......Holcus. 28
—below.. ....§ Arrhenatherum. 31
k Spikelet with definitely 2 perfect flowers. Pale subentire, awn dorsal............. ......Aira. 29
k Spikelet with 2 or more perfect flowers. Pale 2-toothed at apex...(*m*)
m Awn between the two teeth, twisted ; glumes very large ....Danthonia. 30
m Awn dorsal below the middle (except in the cultivated Oat). *Oat*.................Avena. 31
m Awn dorsal above the middle.—Flowers 2—5. Teeth cuspidate..................Trisetum. 32
—Flowers 5 — ∞. Teeth acutish. *Brome*.........Bromus. 33
8. FESTUCACEÆ. (*Spikelets 2 - ∞ -flowered, panicled, awnless, or the lower pale tipped with a straight bristle or awn. Glumes 2.*)
n Glumes definitely 2, all the lower flowers of the spikelet perfect...(*o*)
n Glumes several, indefinite, the lower flowers abortive and glume-like...(*p*)
o Flowers fringe-bearded at the base. Pales 3-cuspidate or entire...(*q*)
o Flowers beardless. Lower pale mucronate or awn-pointed (except in one Festuca)...(*r*)
o Flowers beardless. Lower pale obtuse or acute, not at all awned...(*s*)
q Lower pale 2- or 3-cuspidate and 1–2-awned. Upper pale entire.......................Tricuspis. 34
q Lower pale 2-cuspidate and 1-awned. Upper pale entire. 8—12f.....................Arundo. 35
q Lower and upper pale both entire and pointless at apex.........................Graphephorum. 36
q Lower pale long-pointed, *white* as well as the glumes and hair. *Pampas Grass*.....Gynerium. 37
r Glumes and pales keeled,—herbaceous, 5-veined. Flowers glomerate............Dactylis. 38
—membranous, 3-veined. Panicle spicate...............Kœleria. 39
r Glumes and pales rounded on the back,—both coriaceous. Grain free.........Diarrhena. 40
—pale papery, grain adherent. *Fescue*....Festuca. 41
s Spikelets 2–3-flowered, with some abortive terminal flowers. Pale papery, not keeled...(*t*)
t Upper glume broad-obovate, shorter than the flower. ....Eatonia. 42
t Upper glume oblong, 7–9-veined, longer than the flowers. *Melic*............... ... .Melica. 43
s Spikelets 2–50-flowered, all perfect. Pales usually thin...(*u*)
u Lower pale keeled, 3-veined, membranous like the glumes... ....Eragrostis. 44
u Lower pale keeled, 5-veined, usually cobwebbed at base. *Spear Grass*.................Poa. 45
u Lower pale convex-keeled, obscurely 9-veined. Panicle spiked...............Brizopyrum. 46
u Lower pale convex, 7-(—5)-veined, never webbed at base. *Manna*................Glyceria. 47
u Lower pale convex-ventricous, cordate, obscurely veined. *Quake*.....................Briza. 48
p Herbaceous.—Flowers glabrous, awnless, falcate-pointed.... ....Uniola. 49
—Flowers silky-villous at base. Tall, stout. *Reed*..........Phragmites. 50
p Woody, tall (the flowering branches low). Flowers short-awned........Arundinaria. 51
9. HORDEACEÆ. (*Spikelets 1–10-flowered, sessile, alternate in a spike. Rachis jointed.*)
v Spikes several. Spikelet solitary at each joint, 1-flowered..........................Lepturus. 52
v Spike single.—Spikelets 1-flowered, 3 at each joint. *Barley*.........................Hordeum. 53
—Spikelets 2 - ∞ - flowered,—several at each joint. *Hedgehog*............Elymus. 54
—1 at each joint...(*w*)

w Glume 1, in front of the spikelet which is edgewise to the rachis. *Darnel*.........LOLIUM. 55
w Glumes 2, opposite.—Spikelet 3 – ∞ - flowered. *Witch G.* *Wheat*...............TRITICUM. 56
—Spikelet 2-flowered. *Rye*.......................................SECALE. 57
10. CHLORIDEÆ. (*Spikelets in 1-sided jointless spikes, 1 – ∞ -flowered. Upper flower abortive.*)
x Spikes very slender, many, in an equilateral raceme...(*y*)
y Spikes raceme-like. Spikelets with several perfect flowers....................LEPTOCHLOA. 58
y Spikes with sessile, 2-flowered spikelets, one flower a rudiment..............GYMNOPOGON. 59
x Spikes slender, several, digitately arranged above, or, in No. 60, axillary...(*z*)
z Spikelets with 1 perfect flower,—awnless, globular, no rudiment...............MANISURUS. 60
—awnless, oblong, with a rudiment...............CYNODON. 61
—awned, glume 3-lobed.........................EUSTACHYS. 62
—awned, glume acute...........................CHLORIS. 63
z Spikelets with several perfect flowers.—Flowers awnless.........................ELEUSINE. 64
—Flowers awned..................DACTYLOCTENIUM. 65
x Spikes thick and dense, 1 — ∞. Spikelets with 1 perfect flower...(*aa*)
aa Spikes several or many. Flower with no rudiment..............................SPARTINA. 66
aa Spikes 1, few, or many. Flower with a terminal rudiment....................BOUTELOUA. 67
aa Spike solitary, recurved. Awns terminal and dorsal...........................CTENIUM. 68
11. SACCHARIEÆ. (*Spikelets in pairs or 3's, 2-flowered, the lower flower abortive. Fertile pales thinner than the glumes, except in No.* 72.)
bb Flowers (the fertile) imbedded in the cavities of glabrous, jointed spikes...(*cc*)
cc Spikes monœcious, ♂ abortive, ♀ below, both naked. *Sesame*.................TRIPSACUM. 69
cc Spikes monœcious ♂ above panicled, ♀ below enveloped in *husks*. *Maize*...............ZEA. 70
cc Spikes uniform,—terete. The pedunculate spikelet abortive.................ROTTBŒLLIA. 71
—compressed. Both spikelets fertile.....................STENOTAPHRUM. 72
bb Flowers not imbedded, spicate or panicled, mostly long-bearded...(*dd*)
dd Both spikelets of each pair fertile.—Lower flower awned. *Plume G*..........ERIANTHUS. 73
—Flowers awnless. *Sugar-cane*...........SACCHARUM. 74
dd Only one spikelet of each pair fertile.—Fls. and rachis hairy. *Beard G*.....ANDROPOGON. 75
—Flowers and rachis smoothish...........SORGHUM. 76
dd The lower spikelet on each spike fertile, in a bony shell. *Job's-tears*................COIX. 77

21. PENICILLÀRIA SPICÀTA. Erect, 4f, branching, with broad flat leaves. Panicle cylindric-oblong, 1f, compact, consisting of innumerable simple branches, each with 2 or 1 spikelet at the end, and clothed with spreading hairs. Each spikelet bears at length a white ripened grain. ① E. India.

35. ARUNDO DONAX. A tall, handsome Reed, from Spain. 10f. The leaves are broad or lanceolate, very smooth, shining, dark green, or (in a variety called *Gardeners' Garters*) green and white-striped. The panicle is broad, spreading, diffusely branched, the glumes as long as the flowers.

37. GYNÈRIUM ARGÉNTEUM. PAMPAS GRASS. A magnificent Reed, from S. America, becoming common. ② Its leaves are narrow, channelled, in a dense radical cluster, recurved. Culms 10—18f, clustered, bearing dense hairy panicles 1½—2f long, silvery-white with innumerable flowers and their long silky hairs. Some of the panicles are fruitful (♀), others barren (♂).

63. CHLORIS RADIÀTA, from S. Africa, is an elegant Grass, ♃. Culm erect, 1f, flattened, bearing at top a dense cluster of spikes, radiating horizontally from a common centre. Spikes unilateral, spikelets each 2-flowered, the flowers both with long awns, the lower perfect and fertile. Leaves flat, linear, obtuse, sheath hairy.

SUBKINGDOM, CRYPTOGAMIA,

OR FLOWERLESS PLANTS. Vegetables destitute of true stamens and pistils, gradually descending to a mere cellular structure, with reproductive organs of 1 or 2 kinds, producing, instead of seeds, minute, dust-like bodies (spores) having neither integuments nor embryo.

PROVINCE, ACROGENS. Flowerless plants, having a regular stem or axis which grows by the extension of the apex only, without increasing in diameter, generally with leaves, and composed of cellular tissue and scalariform ducts. (Ferns, Mosses, Club-mosses, Horsetails, &c.)

ORDER CLVI. MARSILIACEÆ. PEPPERWORTS.

Herbs creeping or floating, with the *leaves* petiolate or sessile, circinate in vernation. *Fruit* (sporocarps) situated at the base of the leaves or leaf-stalks, containing the capsular *sporanges* of one kind with 2 kinds of spores, or of 2 kinds with the different spores separated.

* Leaves compound, on slender petioles, with 4 leaflets. Stems creeping............MARSILIA. 1
* Leaves simple, grass-like, radical. Stem a corm..................................ISOETES. 2
* Leaves minute, lobed, imbricated. Stem filiform, floating free......................AZOLLA. 3

1. **MARSÍLIA**, L. Sporocarps at the base of the leaf-stalks, of one kind, 2-celled, cells transversely many-celled, separating into two lobes at maturity. Sporangia inserted on each horizontal partition, of 2 kinds, some 1-spored, others ∞-spored. ♃ Stems creeping and rooting. *Leaves* petiolate, apparently radical, *of* 4 *whorled leaflets*, resembling clover.

1 **M. quadrifòlia** L. Lfts. round-cuneiform, as broad as long, glabrous; sporocarps oblong, smoothish, 1, 2, or 3 on each short peduncle, as large as a peppercorn. ♃ Petioles 3—5′ high. Margin of pond, Litchfield, Conn. (Prof. Eaton). Leaves floating.

2 **M. vestìta** Hook & Grev. Lfts. cuneiform-obovate, longer than broad, glab.; sporocarps glob.-oval, 2½″, hisp., 1 only on each short (3″) peduncle, 2-*toothed* on back. S-W.

3 **M. uncinàta** Braun. Lfts. cuneiform-obovate, hispid, petioles 1—2′ high; sporocarps 2″, subsessile at the base of the petioles, clothed with rust-colored wool. Iowa.

2. **ISÒETES**, L. QUILLWORT. Sporocarps oval, 1-celled, of 2 kinds, sessile in the axils of the radical lvs. and adhering to them. Spores in the *outer* sporangia larger, globular; in the *inner* minute, powdery. ♃ ♒ Leaves linear, grass-like, clustered on the short corm.

* Species growing under water, generally wholly submersed, in ponds, &c..Nos. 1—3
* Species growing in shallow water, or in damp grounds, emersed......... Nos. 4—7

1 **I. lacùstris** L. Lvs. 2—6′, subulate, rigid, erect-spreading; sporocarps round-ovate, unspotted, the larger spores with crested ridges. Varies with the leaves setaceous-subulate and recurved, the sporocarps rarely a little spotted. N.

2 **I. echinóspora** Dur. Lvs. subulate, 3—10′, red at base, 15—30 in number; sporocarps round-ovate, spotted, larger spores echinate with minute points. N. J., Pa., & N.

3 **I. fláccida** Shutt. Lvs. *flaccid*, 1—2f long, almost filiform, yellowish green; sporocarps oblong-ovate; spores not netted, minutely roughened. Ponds and lakes. Fla.

4 **I. ripària** Eng. Lvs. 10–30 in number, 4–8′, lin.; sporocarps oblong, spotted; spores with a band of crested ridges, ash-colored; leaves emersed. Del. R. (Porter), and N.

5 **I. saccharàta** Eng. Leaves few (7—15), subulate-filiform, 2—3′, recurved; sporocarps ovate, spotless; spores minutely tubercled. Wicomico R., Md. (Canby, Porter).

6 **I. melanópoda** J. Gay. Leaves very slender, 8—10′, carinate on the back, brown at base; sporocarps brown; spores smooth, smaller than in No. 5. Ill. (Prof. Porter).

7 **I. Engelmánni** Braun. Leaves 25—100, 10—20′ long, filiform-linear, weak; sporocarps oblong, spotless; spores honeycombed all over. Shallow waters, E. and W.

β. grácilis. Leaves about 10, very flaccid, 1f. N. E. to Ill. (J. Wolf).

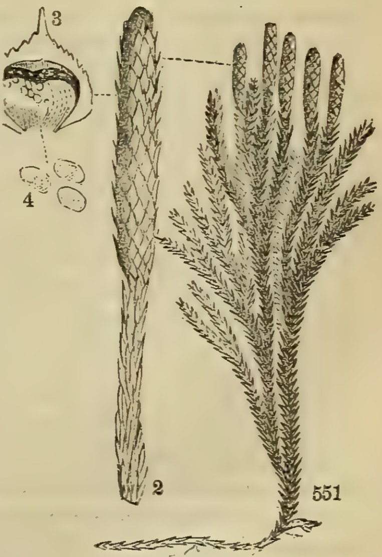
γ. válida. Lvs. very numerous, 2f, from a stock 6″—1′ thick. Del. & Pa. (Porter).

3. **AZÓLLA**, Lam. Small floating plants, with filiform stems and minute imbricated leaves or fronds. Sporocarps of 2 kinds, sessile on the under side of the branches, the smaller sterile, filled with *antheridia*, the larger fertile, thin, containing *sporangia* on stalks, each with several spores.

A. Caroliniàna Willd. Lvs. ovate-oblong, obtuse, fleshy, ½″, reddish beneath; sterile fruits 1 or 2 at the base of the fertile, and many times smaller. Still waters, N. & W.

ORDER CLVII. LYCOPODIACEÆ. CLUB MOSSES.

These are interesting evergreen creepers or runners, rarely erect, branching, abounding in ducts, with the *leaves* small, numerous, crowded, entire, lanceolate or subulate, 1-nerved. *Fruits* sessile, axillary or crowded into a spike, 2-valved, containing few rather large spores, or numerous minute ones appearing like powder.



551, Lycopodium dendroideum. 552, A single spike. 553, A scale with its axillary sporange bursting. 554, Spores.

1. **LYCOPÒDIUM**, L. CLUB MOSS. Spore-cases all of one kind, 1-celled, reniform, opening transversely, 2-valved; spores numerous, minute, sulphur-yellow.—Leaves in 4, 8, or 16 ranks.

§ Fruit in pedunculated spikes (the fertile branches nearly leafless)...(*c*)
§ Fruit in sessile spikes (the branches leafy throughout)...(*b*)
§ Fruit scattered, axillary, forming no distinct spike.........................Nos. 1, 2
  b Leaves of the spike bract-like, discolored..............................Nos. 3, 4
  b Leaves of the spikes and stems all alike..................................Nos. 5, 6
    c Spikes several (2—6) on each peduncle....................................Nos. 7, 8
    c Spike solitary on each peduncle...Nos. 9, 10

1 **L. Selàgo** L. *Fir Club Moss.* Erect, 2—6′, fastigiately branched; lvs. covering the branches, all alike, entire, acute and pungent, awnless. Tops of high mountains, N.

2 **L. lucídulum** Mx. *Shining C.* Ascending, forking, 8—16′; lvs. in 8 rows, linear-lanceolate, denticulate, shining, spreading or reflexed, pointed, large for the genus (3—4″), the fruitful ones like the rest, as in No. 1. Damp woods.

3 **L. inundàtum** L. *Marsh C.* Stem creeping, often submersed, the simple solitary ped. 1—3′ (Conn., Mr. Bowles) or 4—7′ (Mass., Dr. Ricard); leaves soft and fine, curving upward: spike solitary, 1—1½′ long, leafy. Swamps, Can. to Car.

4 **L. alopecuroìdes** L. Sterile branches decumbent, shorter than the tall (7—20′) erect fertile ones; leaves crowded, subulate, awned; spikes leafy, 2—3′ long. Swamps in pine-barrens, N. J. to Fla. and La.

5 **L. annótinum** L. Creeping, branches twice forked, ascending 6—8′; leaves in 5 rows, lance-linear, spreading, denticulate; spikes solitary. Woods, N.

6 **L. dendroìdeum** Mx. *Tree C. Ground Pine.* Erect, about 8′, with its erect branches spirally arranged, forked and crowded; lvs. lance-linear, in 6 equal rows; spikes several but solitary, 1½′, yellow-brown. Woods. Very elegant.

β. obscùrum. Branches spreading; spikes 1 or 2, greenish brown.

7 **L. Caroliniànum** L. Stem and branches creeping and rooting; lvs. appearing 2-ranked, the lateral spreading while the others are appressed, lanceolate; peduncles simple, 2—4′, bearing each a single spike. Barrens, N. J., and S.

8 **L. sabinæfòlium** Willd. *Ground Fir.* Long, creeping; branches erect, short, with fastigiate branchlets; lvs. terete-subulate; ped. short. White Mts., and N.

9 **L. complanàtum** L. *Festoon Ground Pine.* Long, trailing; branches repeatedly forking, fan-shaped, spreading; leaves 4-ranked, the marginal connate, diverging, the others distinct, appressed; peduncles long, with 4—6 spikes. Woods.

10 **L. clavàtum** L. *Common C.* Extensively creeping, branches ascending; leaves scattered, incurved, bristly-acuminate; peduncles erect, remotely bracted, 3—5′, bearing a pair of straight spikes 2′ long. In shades: common.

2. **SELAGINÉLLA**, Spr. DWARF CLUB MOSS. Fruits of two kinds, viz., *antheridia*, which are 1-celled, opening at apex; and *oöphoridia*, larger, containing 1—4 (rarely 6) globous-angular grains.—A large genus. The species are cultivated in every greenhouse. Spikes quadrangular, bracts in 4 rows. (Lycopodium L.)

§ Leaves all alike and similarly imbricated all around. Native..............Nos. 1, 2
§ Leaves of 2 kinds, in 4 rows, those of the 2 lateral rows larger and spreading, of the 2 intermediate rows superficial, small, appressed...(*a*)
a Slender rootlets produced along the stems.—*x* Leaves unequal-sided..Nos. 3—5
—*x* Leaves equal-sided ....Nos. 6—8
No rootlets, &c.—*y* Stems erect, frond-like, simple, stalk-like below..Nos. 9—11
—*y* Stems diffuse, branched from the base...........Nos. 12, 13

1 **S. rupéstre** (L). Sts. ascending, 2—4′, divided into numerous tufted, mossy branches; leaves crowded, fine, blue-green, ciliate; spike indistinct, 6″. Rocks.

2 **S. selaginoìdes** (L). Stem filiform, creeping, branches suberect, 3—6′, the fertile simple, 1-spiked; leaves lanceolate, yellow-green, ciliate. Woods, N.

3 **S. apus** Spr. Stem weak, loosely branched, with hair-like rootlets near the base; leaves ovate, slightly oblique, acutish, the smaller ones pointed. Damp. †

4 **S.** STOLONÍFERA. Sts. producing long threadform rootlets below, 3-4-pinnately branched; branchlets 2—4″ broad; lvs. imbricated, ovate, entire, obtuse, the smaller ones with a filiform straight point. The older stems become zigzag. 6-10′. Com. (S. Mertensii.)

5 **S.** DENTICULÀTA (or Kraussiàna). Prostrate, delicate, remotely and somewhat 3-pinnately branched; leaves 1″, oblong-ovate, *minutely denticulate*, acute, distant on the stem, crowded on the branchlets; smaller leaves with reflexed points. Very common.

β. VARIEGÀTA. Ends of the branchlets with their leaves white. Rootlets hair-like.

6 **S.** UNCINÀTA (or cæsia). Long-creeping, with hair-like rootlets, 2-3-pinnately branched,

branchlets crowded, short, 2″ wide; leaves crowded, oblong, entire, obtuse, the smaller ones with an *uncinate* (reflexed) slender point.

7 **S.** SERPENS. Stems prostrate, with hair-like rootlets, 2–3-pinnate; branchlets short and crowded, 1″ wide; lvs. crowded, round-ovate, cordate, obtuse, entire, the smaller acute.

8 **S.** DELICATÍSSIMA. Sts. creeping, 5—8′, rooting, filiform, loosely 2-3-pinnate, 1″ wide; leaves ovate, obtuse, ciliate, not crowded, the middle ones scarcely smaller, acute.

9 **S.** CAULÉSCENS. Glabrous, suberect, 12—18′, 3-4-pinnately branched, fern-like, and lanceolate in outline; branchlets close, 1½″ wide; leaves close, ovate, entire, very acute, the points turned upward; smaller leaves mucronate; stem straw-colored.

10 **S.** WILLDENÒVII. Like the last as to stems and branches, but they are finely pubescent, and the leaves are less crowded, ovate, and obtuse. 6—12′, ovate in outline.

11 **S.** ERÝTHROPUS. Stems red, with scattered, appressed leaves; frond wide-spread, somewhat palmate, with crowded branchlets and leaves, branchlets 1½″ wide; leaves ovate-oblong, oblique, obtuse, ciliate, the smaller with long straight points.

12 **S.** CUSPIDÀTA. Stem or frond 3—6′, densely and somewhat dichotomously branched; branchlets 1″ wide; leaves closely imbricated, all nearly alike, elliptical, ciliate, bristle-pointed, with the point inclined upward.—A variety (perhaps the fertile stems) are lanceolate in outline, 2-3-pinnately branched.

13 **S.** LEPIDOPHÝLLA, *Resurrection Moss*, is a roundish ball when dry. In a cup of water it soon expands into a dense circle of dark-green, densely 2–3-pinnate fronds, with innumerable oval, obtuse, entire leaves. From Lower California.

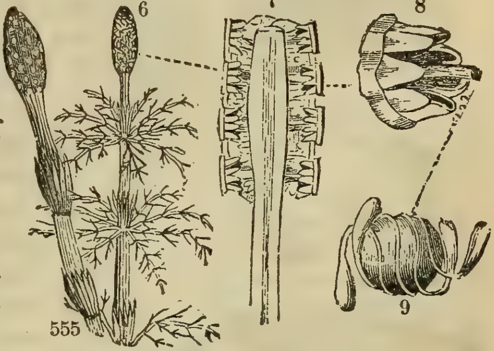
3. **PSILÒTUM,** R. Br. Sporangia sessile, 3-celled, imperfectly 3-valved by terminal chinks, filled with farinaceous spores.—Stem fork-branched, with alternate, minute leaves, as if leafless.

P. tríquetrum Swtz. Stem erect, 8—10′, many times forked, and, with the branches, 3-angled; leaves remote, 2/8″; fruit 3-lobed, sessile along the branches. E. Fla.

ORDER CLVIII. EQUISETACEÆ. HORSETAILS.

Plants leafless simple stems, or with whorled branches. *Stems* striate-sulcate, jointed, fistular between, and separable at, the joints. *Sheaths* dentate, crowning each internode. Fructification a dense, oblong-cylindric, terminal, and cone-like spike, composed of 6-sided, peltate scales, arranged spirally, bearing beneath 4—7 spore-cases, which open laterally. *Spores* globular, each with 4 *elaters* attached, involving them spirally, or open when discharged. (See Figures.)

EQUISÈTUM, L. SCOURING RUSH. Character the same as that of the order.—The sheaths may be regarded as a whorl of united lvs. The cuticle abounds in silex.



555, Equisetum arvense. 556, E. sylvaticum. 557, Section of the spike, enlarged. 558, A peltate scale with 7 sporanges beneath (or one compound sporange), magnified. 559, A spore with its elaters highly magnified.

§ Species fruiting in Spring and decaying before the following Winter...(*a*)

§ Species fruiting in Summer and lasting through the following Winter...(*b*)

a Fertile stems never branching, the sterile with simple, whorled branches..Nos. 1, 2
a Fertile stems at length, like the sterile, with compound, whorled branches..Nos. 3, 4
  b Stems with whorls of simple branches from the middle joints..........Nos. 5, 6
  b Stems mostly simple, large, 20-40-furrowed.............................Nos. 7—9
  b Stems always simple, very slender, 3-9-furrowed....................Nos. 10, 11

1 **E. arvénse** L. Fertile stems erect, 6—8′, simple; sterile 12-14-furrowed, with simple, ascending, 4-angled branches; sheath cut into long dark-brown teeth; spike 6—12″, oblong. Can. to Va. and Ky. The sterile stems appear after the fertile.

*β. **serotinum.*** Sterile plant also producing a late spike of fruit. Pa. (Porter).

2 **E. Telmateìa** Ehr. *Ivory H.* Sterile stem 2—5f, *white*, about 30-furrowed, its 30 branches 4-angled; fertile stems simple; sheaths with subulate teeth. L. Superior.

3 **E. sylváticum** L. Stems 12- or 13-furrowed, both kinds with *compound*, deflexed, angular branches, 9—16′. Woods and low grounds. North.

4 **E. praténse** Ehr. Stems 10-12-furrowed, both kinds soon producing *simple*, straight branches, in several whorls; branches 3-angled. N. W.

5 **E. limòsum** L. *Pipes.* Stems 2—3f, smooth, erect, 15-20-striate, mostly with a few irregular, simple, 5-sided branches near the middle; sheaths white above, with 15—20 teeth, tipped with black. Shores and swamps.

6 **E. palústre** L. Sts. 1—1½f, erect, with 6—8 prominent striæ; branches few, sheaths with as many pointed teeth as striæ. Marshes, N. Rare in the United States.

7 **E. lævigàtum** Braun. Stems 2—3f, erect, simple or some branched; sheaths long (6—7″), close, green, with 20—25 black teeth; branch sheaths 8-toothed. Miss. River.

8 **E. robústum** Braun. Sts. 2—4f, very stout, some branched above; sheaths short (3—4″), close, with 40 (in the branches 11) deciduous teeth, and a black band near the base, rarely with another above. River banks, W. States to California!

9 **E. hyémale** L. *Scouring Rush.* Stems all simple, erect, 2f, very rough with silicious points; sheaths ashy-white, black at base and summit, short (2—3″), with about 20 subulate, awned, deciduous teeth. Conspicuous in wet shades.

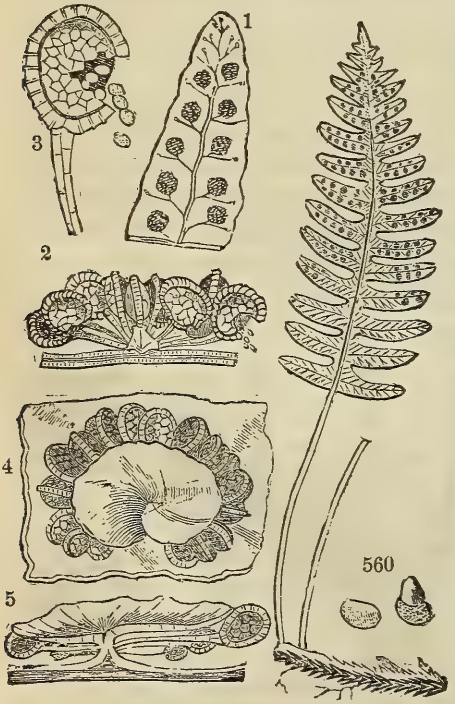


Fig. 560, Polypodium vulgare, frond pinnate. 561, A leaflet of the frond enlarged, showing the sori. 562. One of the sori enlarged, showing the sporangia. 563, One sporange further magnified, bursting and discharging its spores. 564, A sorus of Aspidium marginale covered with the indusium. 565, Side view of the same.

10 **E. variegàtum** Schleicher. Simple (branched from base), slender, straight, 6—12′, 5-9-furrowed; sheaths very short, with brown bristle-tipped teeth. N. Rare.

11 **E. scorpoìdes** Mx. Sts. tufted, filiform, 4-8′, recurved, 3-4-furrowed; sheaths black, teeth 3 or 4, scarious and bristle-tipped. Woods, Penn., and N.

Order CLIX. FILICES. Ferns.

Stem a perennial, creeping, horizontal rhizome, or sometimes erect and tree-like. *Fronds* (fruit-bearing leaves) variously divided, rarely entire, with mostly forked veins and *circinate* vernation. *Fruit* occupying the back or margin of the fronds arising from the veins. *Sporangia* (spore-cases) of one kind, scattered, or clustered in *sori*, 1-celled, containing numerous minute spores.

A large and interesting Order, distinguished for their elegant, plume-like foliage. They are usually a few inches to a few feet high, but some of the Tropical species, as the Cyatheæ, are 15 to 25 feet, vieing with the Palms in size and beauty.

☞ The *stipe* is the stalk of the frond, and the *rachis* its continuation through it. The *pinnæ* (or *pn.*) are the first divisions of a divided frond (often called leaflets). *Pinnulæ* (or *pnl.*) are the first divisions of the pinnæ when further divided. *Segments* (*seg.*) are the *final* divisions, and the partial divisions of the segments are *lobes*, &c. The *sori* (fruit-dots) are either *naked*, or covered with an *indusium* (see cut).

§ POLYPODIACEÆ. THE TRUE FERNS, with fronds mostly radical, circinate in bud. Sporangia in *sori*, pedicellate, with a vertical, elastic ring, opening transversely...(*f*)
§ CYATHEACEÆ. THE TREE FERNS, with fronds on an erect trunk. Sporangia as in § 1...(*e*)
§ HYMENOPHYLLACEÆ. PELLUCID FERNS; sporangia in a cup and on a thread...(*d*)
§ SCHIZÆCEÆ. Very slender vines or fronds. Sporangia with a ring-crown at apex...(*c*)
§ OSMUNDIACEÆ. Fronds stout, radical. Sporangia with no ring, 2-valved...(*b*)
§ OPHIOGLOSSACEÆ. Frond single (in our species), on an erect stem. Sporangia with no ring...(*a*)
a Fruit in a spike. Frond entire, reticulate-veined.......................OPHIOGLOSSUM. 1
a Fruit in a panicle. Frond divided, fork-veined.......................BOTRYCHIUM. 2
b Fronds pinnate or bipinnate, with straight, forked veins.......................OSMUNDA. 3
c Fronds palmately lobed. Stems climbing, 3—4f.......................LYGODIUM. 4
c Fronds linear-filiform, undivided, a few inches high.......................SCHIZÆA. 5
c Fronds 3-parted, middle division sterile, the lateral paniculate.......................ANEIMIA. 6
d Fronds pellucid or opaque. Sporangia with a transverse ring.......................TRICHOMANES. 7
e Fruit-dots in little round cups. Trunk and leaves smooth.......................CYATHEA. 8
e Fruit-dots becoming entirely naked. Fronds prickly or hairy.......................ALSOPHILA. 9
e Fruit-dots enclosed in the reflexed tip of the lobe, with two valves.......................§ BALANTIUM. 22
f Sporangia scattered singly all over the surface (not in sori), naked...(*g*)
f Sporangia collected in dots (sori) growing from the veins...(*h*)
g Fronds simple or pinnate. Pinnæ on short petiolules.......................ACROSTICHUM. 10
g Fronds forked at the summit, entire below, the sterile different.......................PLATYCERIUM. 11
h Sori (fruit-dots) naked, having no covering of any kind...(*k*)
h Sori involved (at first) in the rolled segments of the panicled fertile frond...(*m*)
h Sori not involved, but invested with special coverings (called *indusia*)...(*n*)
k Fronds smooth or scaly, never powdery. Sori distinct, roundish.......................POLYPODIUM. 12
k Fronds covered with powder on the back. Sori in many dorsal lines.......................GYMNOGRAMMA. 13
k Fronds powdery or scaly on the back (bipinnate). Sori in a marginal line.......................NOTHOLÆNA. 14
k Fronds linear, simple. Sori in a continuous line on the split margin. Fla......VITTARIA *lineata.*
m Fertile frond bipinnate, segments berry-like. Veins reticulated.......................ONOCLEA. 15
m Fertile frond pinnate, pinnæ moniliform. Veins forking.......................STRUTHIOPTERIS. 16
m Fertile fronds bipinnate, segments oblong, soon opening.......................ALLOSORUS. 17
n Sori marginal, indusia only the reflexed altered margin of the frond...(*o*)
n Sori marginal, indusium double—a scale combined with the margin...(*p*)
n Sori dorsal, oblong or linear, indusium attached to the side of a vein...(*q*)
n Sori dorsal, round or roundish, indusium on the back or the tip of a vein...(*x*)
o Fronds of 2 kinds, the fertile contracted. Sori continuous to apex.......................LOMARIA. 18
o Fronds all similar, smooth. Indusia continuous all around. Stipe green or brown..PTERIS. 19
o Fronds woolly, &c. Sori separate or continuous. Stipe brown, hairy......CHEILANTHES. 20
o Fronds smooth. Sori separate. Stipe black and polished.......................ADIANTUM. 21
p Indusium a 2-lipped cup at the edge of the segments.......................DICKSONIA. 22
p Indusium an entire cup or goblet at the edge of the segments.......................DAVALLIA. 23
q Sori parallel to the mid-vein, the indusia opening toward it...(*r*)
q Sori oblique to the mid-vein, borne laterally on the veinlets...(*s*)
r Sori linear, nearly continuous, in 2 rows, sunk in the frond.......................WOODWARDIA. 24
r Sori oblong, remote, in two rows and superficial. Stipes black.......................DOODIA. 25
r Sori linear, in 1 double row, the whole length of the segment.......................BLECHNUM. 26
r Sori oblong, in 1 short double central row. Frond finely cleft.......................ONYCHIUM. 27
s Indusia single, regularly arranged, in 2 rows.......................ASPLENIUM. 28
s Indusia single, scattered irregularly. Frond simple or lobed.......................CAMPTOSORUS. 29
s Indusia double, regularly arranged. Frond simple.......................SCOLOPENDRIUM. 30

x Indusium cupform, fringed, fixed beneath all around the sorus.. ....WOODSIA. 31
x Indusium hoodform, fixed by the base and 2 sides..............................CISTOPTERIS. 32
x Indusium reniform, opening only toward the margin of the segm. Fla...NEPHROLEPIS *exaltata.*
x Indusium round-reniform, fixed in the midst, open all around........................ASPIDIUM. 33

1. **OPHIOGLÓSSUM,** L. ADDER'S TONGUE. Sporangia roundish, naked, opening transversely, arranged in two rows along the margins of the fertile, contracted, spike-like frond. Veins reticulated.

1 **O. vulgàtum** L. Root of thick fibres; stem simple, bearing 1 oblong-ovate, entire, smooth frond, 2—3′, with no mid-vein, and a terminal spike, 1—2′. A curious little plant, in low grounds. Vernation straight, as in all this section,—not circinate.

2 **O. bulbòsum** L. Root a globular corm; frond ovate to reniform, on the stem close to the ground. Wet pine-barrens, N. J., and S. Often 2 stems from 1 corm.

2. **BOTRY̌CHIUM,** Swartz. MOONWORT. GRAPE FERN. Sporangia subglobous, 1-celled, 2-valved, distinct, coriaceous, smooth, adnate to the compound rachis of a racemous panicle. Valves opening transversely.

§ Frond ternately divided, segments palmately veined........................Nos. 1, 2
§ Frond pinnately divided, segments pinnately veined.......................Nos. 3—5

1 **B. lunarioìdes** Swtz. Scape 8—12′, bearing a stalked frond near the base and a panicle of numerous little 2-ranked spikes at the top; frond in 3 bipinnatifid divisions; segment obliquely lanceolate, crenulate. Shady pastures and woods.

β. disséctum. Frond more numerously dissected, almost tripinnatifid.

2 **B. simplex** Hitchcock. Frond simple, or 3-lobed or parted, segm. broad-wedge-obovate, small, incised or subentire, unequal; spike compound, interrupted, small. Dry hills, Vt., Mass. Whole plant 3—6′. Frond 6—12″, short-stalked, near the base.

3 **B. negléctum** Wood. Frond 1—2′, simply pinnate, with oval or ovate incised pinnæ, short-stalked, on upper part of stem, which is 5—8′ high. Pan. 1—2′. N. H., Vt., to Pa.—*Prof. Porter* regards both this and No. 2 as var. of B. matricæfolium Braun.

4 **B. lanceolatum** Angst. Frond bipinnatifid, closely sessile, triangular in outline with lanceolate, incised segments; panicle 2- or 3-pinnate. N. J., Pa., to L. Sup. (O. B. Wheeler). Certainly distinct from No. 3.

5 **B. Virgínicum** L. *Rattlesnake Fern.* Stem 1—2f, with the large (5—8′) tripin., triangular frond sess. at or above the middle; ultimate segm. obtuse, 3-5-toothed; pan. decompound, 3—6′, reddish br. A beautiful Fern, in damp woods, not uncom. Jn., Jl.

3. **OSMÚNDA,** L. FLOWERING FERN. Sporangia globular, half 2-valved, roughened on the surface somewhat in lines, pedicellate and clustered on the lower surface of the frond or a portion of it, which is more or less contracted into the form of a panicle. Spores green. Tall, handsome Ferns. Veins forked, straight. June.

§ Frond bipinnate with distinct pinnæ, the upper part contracted and fertile....No. 1
§ Frond pinnate with pinnatifid pinnæ, partially or separately fertile........Nos. 2, 3

1 **O. regàlis** Mx. A large and beautiful Fern in meadows and swamps; fronds 3—4f, glabrous, bipinnate, fruiting above in an ample panicle; pinnæ with 6—9 pairs of distinct, oblong, serrulate, subsessile leaflets; fruit rust-colored.

2 **O. cinnamomea** L. Sterile fronds pinnate, in clumps 3—5f; pinnæ pinnatifid with ovate-oblong, obtuse, entire segments; fertile frond bipinnate, pinnæ all contracted, panicled, clothed with cinnamon-colored wool.

3 **O. Claytoniàna** L. Fronds ample, 2—3f, smooth, pinnate, the pinnæ lance-linear, pinnatifid, some of the intermediate ones fertile, contracted and raceme-like.

4. **LYGÒDIUM,** Swartz. CLIMBING FERN. Sporangia sessile, arranged in 2-ranked spikelets issuing from the margin of the contracted frond, open-

ing on the inner side from the base to the summit. Indusium a scale-like veil covering each sporange. (Fig. 310.)

L. palmàtum Swtz. Smooth throughout; stem flexuous, thread-like or wire-like, climbing 3—5f; fronds palmately 5-7-lobed, 2 on each short stipe, lobes entire, obtuse; upper fronds contracted, fertile, each a cluster of spikelets. Abundant in a swamp in Windsor, Conn. (Dr. Wm. Wood); also rarely found in N. J., Ky., and S.

5. **SCHIZǼA,** Sm. Sporangia oval, crowned with a ring at top, sessile, opening laterally. Indusium continuous, formed of the inflexed margins of the lfts., which are contracted, spike-like, crowded at the top of the frond.

S. pusílla Ph. Fronds clustered, simple, linear-filiform, tortuous, 3—6′, the fertile bearing a few little spikelets at top in two rows. Barrens, Quaker Bridge, N. J. Aug.

6. **ANEÌMIA,** Swtz. Sporangia sessile, crowned with a ring, in 1-sided panicled spikes, in partially or wholly fertile fronds. Indusium none. Fronds erect.

1 **A. adiantifòlia** Sw. Fronds 6—12′, on a slender stipe, 3-parted, the middle division sterile, 2- or 3-pinnate, the lateral ones fertile panicles on long stalks. S. Fla. †

2 **A.** Mandioccàna. Fronds 12—15′, long-stiped, 3-parted like the other, but the sterile division simply pinnate with lance-oblong serrulate pinnæ. S. America.

7. **TRICHÓMANES,** L. Sporangia with a transverse complete ring, and arranged on the base of a thread-like receptacle, which is *in* and exserted *from* a cup at the edge of the pellucid frond.

1 **T. rádicans** Sw. Fronds thin and delicate, 6′, lance-ovate, bipinnatifid, pinnæ triangular, obtuse, very oblique at base; receptacle exserted. South. Rare.

2 **T.** elegans. Sterile frond pinnate, fertile, long-linear, edged and fringed all around with the thread-like receptacles and their cups. From S. America.

8. **CYÀTHEA,** Sm. Sori globular, on the veins, wholly enclosed in an indusium, which soon opens and remains cupform. Sporangia subsessile on an elevated receptacle. ♄ With cylindrical trunks.

C. arbòrea. Trunk 10—20f, unarmed, simple, crowned with a spreading tuft of bipinnate fronds 6—8f long, gracefully arched; pinnulæ again pinnatifid or lobed, cups in 2 rows, smooth, round, entire. Grows near Panama! †

9. **ALSÓPHILA** Áspera. Another Tree Fern, from W. Indies, cult. by Mr. Buchanan, at Astoria, N. Y., under the name of *Hematelia horrida.* Trunk 6—10f, bearing a splendid crown of fronds 4—5f long, arched and spreading, tripinnate. Pinl. deeply lobed, lobes obtuse, each with a double row of fruit-dots, which at first are covered with jagged scales, but finally naked. Stipe and rachis prickly.—**A.** pruinàta, very elegant, with a trunk near 1f, clothed with light-brown woolly hairs, and a crown of light-green bipinnate fronds, 3f long, is growing with the other.

10. **ACRÓSTICHUM,** L. Fronds simple or pinnate. Sporangia scattered (not in sori), occupying the under surface of the whole or a part of the frond. Veins netted.

A. aùreum L. A noble Fern, 3—6f high, coriaceous, evergreen, pinnate, with alternate, lance-oblong, entire pinnæ. Swamps, Fla., and in conservatories.

11. **PLATYCÈRIUM,** Desv. Stag-horn Fern. Fronds coriaceous, net-veined, forking at the summit. Sporangia in large patches on the under surface of the frond. From Africa, &c.

P. ALCICÓRNE. Sterile fronds roundish, lobed, spreading; fertile erect, 10—16′, dark-green above, pale beneath, fruiting on its 2—4 lanceolate segments. Curious.

12. POLYPÒDIUM, L. POLYPODY. Sori roundish, scattered on various parts of the under surface of the frond, with no indusium (cover or involucre).—Ferns of various habit.

* Fronds simple and entire, pinni-veined, with cross veinulets..............Nos. 1, 2
* Fronds pinnatifid or pinnate, with forking veinlets........................Nos. 3—6
* Fronds bipinnatifid, the veinlets forked (PHLEGOPTERIS)..................Nos. 7—9

1 **P. Phyllìtidis** L. Fronds lance-linear, 1—2f, pointed, thin and papery, with the fruit-dots arranged in a double row between the veinlets. Fla., and W. Indies. †

2 **P.** LÍNGUA. Fronds lance-ovate, 6—12′, obtuse, smooth above, rusty-downy beneath, and there covered with the innumerable sori, in rows. China.

3 **P. incànum** Ph. Fronds deeply pinnatifid, 3—6′, thick, clothed with whitish scales beneath; pinnæ oblong-linear, the upper fruitful; sori distinct and separate; veins invisible. Grows on the mossy bark of trees, W. and S.

4 **P. vulgàre** L. Fronds deeply pinnatifid, smooth, 6—12′, pinnæ linear-oblong, alternate, sori large, in 2 rows, distinct, yellow-brown. On shady rocks.

5 **P.** PLUMULA Willd. Fronds lance-linear, 1f × 1½′; pinnæ linear-oblong, very numerous, attached to the hairy rachis by a broad base. Fla., and cultivated.

6 **P.** ANGUSTIFÒLIA. Fronds lin.-lanceolate, 18′ × 2′, bright green; pn. oblong, attached to the chaffy rachis by the mid-vein only, the base auriculed on the upper side.

7 **P. Phlegópteris** L. *Beech P.* Frond bipinnatifid, longer than wide (3—6′), the lower pinnæ curved, but scarcely larger than the middle ones; sori all marginal, about four on each segment; stipe hairy. Woods, Can. to Penn., and W.

8 **P. hexagonópterum** Mx. Frond bipinnatifid, broader than long, rachis peculiarly winged; lower panicle much enlarged, deflexed; sori partly marginal, many on each segment; stipe smooth. Woods. Rather common.

9 **P. Dryópteris** L. *Ternate P.* Frond ternate, the divisions stalked and bipinnate, light green, thin and delicate; sori marginal. Woods, Penn., and N.

β. ***calcàreum.*** Divisions of the frond more rigid, erect. Northward.

13. GYMNOGRÁMMA, Desv. Fronds 2–3-pinnate, covered beneath with a white or yellow farinaceous powder. Sori arranged in rows along the veins. A beautiful genus, much cultivated. Tropical America.

* *Golden Ferns*,—the fronds yellow-powdery beneath......................Nos. 1—3
* *Silver Ferns*,—the fronds white-powdery beneath, 2-pinnate.................No. 4

1 **G.** TRIANGULÀRIS. Stipes clustered, slender, 3—12′, polished, ebony-brown; frond 5-angled, 1—3′, pedately pinnate; pinnæ triangular-oblong, finally the fertile covered with the russet sori beneath. Common in California. Very fine.

2 **G.** SULPHÙREA. Stipe and rachis brown, at first powdery; frond 6—10′, lanceolate, bipinnate; pinnæ lanceolate; segments cuneate, cut-lobed, crenate at the obtuse apex. From Jamaica (Rev. E. Wilson), and cultivated. Very delicate.

3 **G.** CHRYSOPHÝLLA. Frond triangular-lanceolate, bipinnate; pinnæ lanceolate, nearly contiguous; pinnæ cut-crenate-lobed. Golden yellow beneath.

β. MERTÉNSII. Pinnæ rather remote, narrow lanceolate, long-pointed.

4 **G.** CALOMÉLANOS. Frond 2—3f, lance-ovate, stipe and rachis brown, polished; segments entire or with a single tooth, cream-white beneath.

β. PERUVIÀNA has the lower segment hastate-lobed and very rich green.

14. NOTHOLÆNA, Br. Frond 1–2-pinnate, scattered, coriaceous, chaffy, or powdery beneath. Sori marginal, linear, continuous, naked. Sporangia short-stalked.

1 **N.** NÌVEA. Very delicate, 6—12′, bright green above, covered with a dense white powder beneath; frond bipinnate; pinnæ roundish, top one lobed; stipe black. Mex.

2 **N.** ECKLONIÀNA. Rare and beautiful, clothed in white wool-like scales, bipinnate, pinnæ ovate, remote, pinnulæ pinnatifid, oblong, segments roundish. South Africa.

15. **ONOCLÈA**, L. SENSITIVE FERN. Fronds scattered, net-veined, the sterile broad, the fertile contracted and panicled, its convolute segments berry-like, enclosing the sori, which are otherwise nearly naked.

O. sensíbilis L. Fronds 1—2f, common in low grounds, very *sensitive* to frost. The fertile dark-brown in color. Sterile fronds deeply pinnatifid, with few oblong entire or lobed pinnæ, the upper confluent. July.

β. ***obtusiloba.*** Fertile frond partially metamorphosed, the segments partly revolute on the fruit. Wendell, Mass. (Mrs. Piper), to N. Y. and Penn.

16. **STRUTHIǑPTERIS**, Willd. OSTRICH FERN. Fronds clustered, the sterile bipinnatifid, fork-veined, fertile much contracted, brown, with the pinnæ revolute into a necklace form, enclosing the sori, which are otherwise destitute of an indusium.

S. Germánica Willd. Sterile fronds in a circular clump, 3—5f; pinnæ numerous, long and crowded, with numerous oblong segments; fertile fronds much smaller, their crowded pinnæ 1—2′ long, appearing later in the season.

17. **ALLOSÒRUS**, Bernh. Fronds small, 2-3-pinnate, fork-veined; the fertile some contracted, margins of the leaflets reflexed and meeting over the confluent sori, but soon opening.

A. acrostichoìdes Spr. Fronds in tufts, bipinnate, 3—6′, pale green with whitish stipes; seg. oblong, the sterile crenate, the fertile entire, petiolulate, 2—3″ long. Isle Royal, in L. Superior (Prof. Porter), W. to Washington Terr. (Rev. Mr. Gray).

18. **LOMÀRIA**, Willd. Fronds clustered, of 2 forms, the fruitful contracted. Sori marginal, linear, continuous; indusium linear, scarious, the reflexed edge of the frond, opening toward the mid-vein.

1 **L.** SPICANT. Fronds pinnate, long, and narrow, the fertile nearly solitary in the midst of the numerous sterile ones, and twice as tall (2—3f) as they; stipe purple, polished. Europe, Oregon. Very elegant. (Blechnum boreale.)

2 **L.** GIBBA. Fronds oblong-lanceolate, pinnate, pinnæ linear-falcate, 1—3′, their broad bases almost confluent.

3 **L.** CILIATÉLLA. Fronds oval to oblong; pinnæ oblong, slightly lobed, truncate at apex, ciliolate-spinescent with the projecting veins.

19. **PTÈRIS**, L. BRAKE. Sori borne on the ends of the veins forming a marginal line or band, covered with the membranous, reflected edge of the frond. Fronds once to thrice pinnate, or decompound.

§ PTERIS *proper*. Sori a mere line. Stipes greenish or pale...(*x*)
§ PELLÆA. Sori forming a broad band. Stipes purple or brown...(*y*)
x Frond triangular, twice or thrice pinnate, lowest pinnæ long-stalked..........No. 1
x Frond pedately pinnate, the pinnæ few and long.......... ....Nos. 2, 3
x Frond pedately bipinnatifid. the pinnæ numerous. ....No. 4
x Frond simply pinnate, with numerous long pinnæ...............................No. 5
y Frond pedate and pinnatifid, as broad as long, 5-angled. †...... ....No. 6
y Fronds pinnate, pinnæ few, the lower again divided. Native.........Nos. 7, 8
y Fronds simply pinnate, or completely tripinnate. Cultivated........Nos. 9—11

1 P. aquilìna L. *Common Brake.* Frond 3-parted, branches bipinnate, segments oblong, obtuse, the terminal often elongated. Abundant everywhere. 2—6f.

β. ***caudàta.*** The terminal segment linear-oblong. Common South.

2 P. Crética L. Pale-bright-green, 1—1½f, smooth; pinnæ lin.-lanceolate, the lower ones 2-parted and petiolulate, serrulate; fertile longer, linear. Fla. Cultivated.

β. ***albi-lineata.*** Pinnæ white-banded in the midst along the mid-vein.

3 P. SERRULÀTA. Bright green, 1—1½f; pinnæ long-linear, decurrent on the rachis, except the lowest pair, which are 2- or 3-parted and short-stalked. China.

β. CRISTÀTA. Each segment expanded at apex into a fan-shaped blade.

4 P. QUADRIAURÌTA. Frond ample, ovate, 1—3f! smooth; pinnæ distinct, pinnatifid, lobes contiguous, oblong, obtuse, with the forked veins conspicuous. Jamaica.

β. ARGYRIA. Pinnæ whitened in the midst along the mid-vein.

5 P. longifòlia L. Tall, 2—3f, rigid; pinnæ lance-linear petiolulate, obliquely truncate at base; stipe, rachis, and mid-veins chaffy-hairy. Fla., and cultivated.

6 P. PEDÀTA. Bright green, 4—6′. Frond 3-parted, as broad as long; lateral pinnæ 2-parted, all deeply lobed, sori in a broad band all around. From the W. Indies.

7 P. grácilis Mx. Delicate, smooth and shining, 4—6′; fronds lanceolate, the sterile bipinnatifid, fertile bipinnate with narrow segments. Rocks, Vt., and W.

8 P. atropurpùrea L. *Rock Brake.* Coriaceous; rachis hairy; lower pn. ternate or pinnate; segments opposite, oblong, margins conspicuously revolute, with edges often meeting behind, as in Allosorus, 3—6—12′. On lime rocks, N. and S.

β. ***Alabaménsis*** (Buckley). Taller (10—20′), bipin. below, some pn. ½-auriculate. S.

9 P. ROTUNDIFÒLIA. Stipe, rachis, and chaffy hairs purple, 1—1½f; frond narrow, simply pinnate; segments small, round or oval, alternate. From New Zealand.

10 P. TRÉMULA. Bright green, 2—3f, tripinnate; pnl. or segments linear-oblong, obtuse, serrulate, the lower ones again pinnatifid. From N. S. Wales.

11 P. HASTÀTA. Frond bipinnate, 12—18′; pinnæ cordate-hastate; segments ovate, the terminal ones much larger, oblong or hastate, or 3-lobed. Varies much. From S. Afr.

20. CHEILǍNTHUS, Swtz. LIP FERN. Fronds small, mostly 2-3-pinnate, chaffy or hairy, mid-vein central. Sori on the ends of the veinlets, distinct, or some confluent, covered by an interrupted or continuous indusium from the edge of the frond. Stipes brown.—Hardly distinct from the preceding genus.

1 C. vestìta Sw. *Indusia separate*,—the reflexed, unchanged tips of the ovate segm.; fronds 5—12′, bipinnate, lin.-oblong, hairy; pn. crenately lobed. Rocks, M. and S., rare.

2 C. tomentòsa Link. *Indusia continuous*,—the membranous margin of the small, obtuse segm.; fronds tripinnate, lance-oblong, rusty, 12—18′. N. C., and W.

21. ADIǍNTUM, L. MAIDEN-HAIR FERN. Sori oblong or roundish, marginal. Indusia membranaceous, formed from the reflexed margins of distinct portions of the frond, and opening inwardly. Stipe ebony-black, polished. Ultimate segments often dimidiate, the mid-vein on the lower margin.—A large and beautiful genus, much cultivated.

* Fronds pedately divided, the divisions 1-3-pinnate; segments oblique....Nos. 1—4
* Fronds pinnately divided 2—4 times; segments subequilateral............Nos. 5—8
* Fronds simply pinnate, with very large opposite oblique segments...........No. 9

1 A. pedàtum L. Very smooth; branches of the regularly pedate frond pinnate; segments rhombic-oblong, 1′, toothed on the upper side, obtuse at apex; sori oblong-lunulate, 8—14′. Damp, rocky woods. Our most elegant native Fern.

2 A. PUBÉSCENS. Stipe rough-pubescent; pn. 5—7, irregularly pedate, hispid beneath, 6—9′ long; segments oblong, 6—8″, contiguous; sori round, crowded. N. Hol. 1f.

3 **A.** TRAPEZIOFÓRME. Frond ample, decompound, glabrous, 2f; segments light green, large (12—18″ × 6—10″), *trapezoidal*, some of them fan-shaped; sori lunulate on 2 of the 4 margins; stipe jet-black. Superb! Jamaica (Rev. S. B. Wilson).

4 **A.** SANCTA-KATRINA, has large obliquely fan-shaped segments cut-lobed and toothed, with the veins uncommonly distinct. Cultivated in Bridgman's Garden, Astoria.

5 **A. Capíllus-Véneris** L. Delicate, bright green, 6—18′, smooth, thrice pinnate at base; segments round-cuneate, lobed, or the sterile toothed; sori reniform, one on each lobe; stipe and branches *capillary*. Lime-rocks, S.: rare. Eur. Cultivated.

6 **A.** CUNEÀTUM. Very delicate, 1f, 4 times pinnate at base, bright green; segm. very numerous, sharply cuneate, 2-4-cut-lobed, 4—6″; sori round-reniform. Brazil.

7 **A.** ÆTHIÓPICUM, TINCTUM and CALLÓPODES, are greenhouse species or varieties, with roundish segments more or less oblique and lobed, 4—7″, with rounded sori, 6—12′.

8 **A.** ALÀTUM, has the rachis narrowly winged, segm. sessile, obovate-long-wedge-shaped at base, coarsely toothed at apex. (Greenhouse of Bridgman & Wiegand.)

9 **A.** MACROPHÝLLUM. Stipe jet-black, simple, bearing about 3 pairs of large, opposite, thick leaflets, and an odd one; leaflets triang.-hastate, oblique; sori linear. Jamaica.

22. DICKSÒNIA, L'Her. DICKSON'S FERN. Sori marginal, roundish, distinct, terminating a vein. Indusium double, the proper one cup-shaped, opening outward, the other formed of a reflected lobule of the margin, and opening inward.

1 **D. pilosiúscula** Willd. Frond bipinnate, lanceolate, 2—3f, with minute glandular hairs; pn. sessile, lanceolate; segm. finely pinnatifid, lobes toothed, each with a minute round sorus. Rocky pastures. Stipe yellowish.

2 **D.** (BALANTIUM) ANTÁRCTICA. A beautiful tree-fern from New Zealand, 3—20f, crowned with many long, heavy, dark-green, tripinnate fronds; pn. and pnl. sessile; segm. oval, 6-crenate; sori globular, with 2 distinct valves. (Buchanan's Conserv.)

23. DAVÁLLIA, Smith. Sori globous, marginal, on the end of a vein, in a goblet or pyxis, half of which is formed by the scarious indusium opening outward. Root-stock creeping above ground, chaffy.

1 **D.** TENUIFÒLIA. Fronds delicate, 6—10′, tripinnate with few pinnæ, triangular-lanceolate; rachis narrowly winged; segments spatulate, toothed. China.

2 **D.** CANARIÉNSIS. *Hare's-foot.* Fronds 3-parted, decompound, ultimate segments elliptical, decurrent, bearing 1 pyxis. 1—2f. Canaries.

3 **D.** DISSÉCTA, is very different, irregularly pinnatifid, or almost entire.

24. WOODWÁRDIA, Sm. Sori straight, linear-oblong, on transverse veinulets, parallel to the mid-vein, in 2 rows. Indusium from the same veinulet, opening inwardly.

§ LORINSERIA. Fronds of 2 forms, net-veined throughout.....................No. 1
§ ANCHISTEA. Fronds all similar, netted only close to mid-vein..........Nos. 2, 3

1 **W. angustifòlia** Sm. Fertile fronds pinnate, with distant linear pinnæ covered with the fruit beneath; sterile lance-oblong in outline, deeply pinnatifid; segm. oblong, 2—3f. Resembles Onoclea. Mass. (Dr. S. Bowles), and S.

2 **W. Virgínica** Sm. Fronds glabrous, lanceolate, pinnate; pinnæ remote, pinnatifid, lance-linear; segments oblong, obtuse, 2—3f. Swamps, E. and S.

3 **W.** JAPÓNICA. Rachis chaffy; frond triangular, as broad as long; pinnæ lanceolate, pinnatifid, with ovate segments. Bright green. 1—2f.

25. DOÒDIA ÁSPERA. Fronds rough, lanceolate, pinnate, 1f, in clumps, the caudex a few inches above ground. Pinnæ oblong-linear, contiguous, with spinescent teeth. Sori in 1 or 2 rows each side.—**D.** CAUDÀTA has linear-lanceolate, pinnate fronds, with remote serrate segments, the terminal one elongated. Both from Australia.

26. BLECHNUM, L. Sori continuous on the cross veinulets, close to and parallel with the mid-vein. Indusia opening inward.

B. serrulàtum Mx. Fronds pinnate, lanceolate, erect; pinnæ sharply serrulate, those of the fertile fronds contracted. Florida.

27. ONÝCHIUM LUCIDUM (or JAPÓNICUM). Delicately beautiful, from E. Ind., and of the easiest culture. Fronds 1—2f, alternately pinnate 3 or 4 times into innumerable linear-acute segments 2 or 3″ long. Few of the segments fertile, with an oblong bivalved sorus on the mid-vein half its length.

28. ASPLÈNIUM, L. SPLEENWORT. Sori linear or oblong, straight (curved in No. 9), separate, regularly arranged, oblique to the mid-vein, each arising with its indusium from the forward side of a lateral vein and opening forward. Veins forked or pinnate.

* Fronds simple and entire, with regular linear fruit-dots......................No. 1
* Fronds simply pinnate.—*a* Pinnæ roundish, nearly as broad as long.. ...Nos. 2, 3
—*a* Pinnæ long,—much longer than wide..........Nos. 4, 5
* Fronds partly bipinnate, with few divisions. Ferns small, 2—8′ high.....Nos. 6, 7
* Fronds twice pinnate, with very many divisions. Large native Ferns....Nos. 8, 9
* Fronds twice or thrice pinnate. Exotic Ferns cult. in conservatories...Nos. 10—12

1 A. NIDUS. *Bird's-Nest.* Fronds thick and rigid, polished green, tongue-shaped, obtuse, 2—4f, clustered in a circle, forming as it were *a nest.* Oahu, &c. A noble Fern.

2 A. FLABELLIFÒLIUM. Fronds very delicate, long and narrow (12—16′); rachis prolonged some 5′ beyond the pn., and rooting at the end; pn. broad-cuneate, lobed and toothed, remote and alternate on the rachis. Australia. Suitable for baskets.

3 A. Trichómenes L. *Dwarf S.* Frond 3—6′, lance-linear, in tufts; pn. roundish, small, subsessile, bearing several sori each; stipe and rachis polished-black. Rocks.

4 A. ebènum Willd. *Ebony S.* Fronds 8—14′, erect, lance-linear; pn. lance-oblong, 1′, some curved, serrate, auriculate on the upper side; stalk polished-brown. Dry.

5 A. angustifòlium Mx. Fronds 2—2½f, in tufts, the inner fertile; pn. lance-linear, alternate, short-stalked, 2—5′, of a thin texture; stalks green. Woods, E. and S.

6 A. Ruta-murària L. *Wall-rue.* Very small and delicate, 2—3′, 2-pinnate at base, pinnate above; pn. petiolulate, cuneate, erose-dentate, few, 3—4″. Dry rocks.

7 A. montànum Willd. Glabrous, 2-pinnate; tufts 4—8′; pn. oblong-ovate, parted into a few (5 or 6) 2- or 3-toothed segm.; rachis green, winged. On cliffs, Penn., & S.

8 A. thelypteroìdes Mx. *Silvery S.* Fronds ample, ovate-acuminate, 1½—3f; stipe pale; pinnæ lance-linear, pointed, distinct, subsessile; segments oblong, obtuse, serrate, sessile on the *winged* rachis, with 2 rows of linear distinct sori. Shady banks.

9 A. Filix-fœ́mina Bernh. *Lady Fern.* Fronds ample, 1—2f, lance-oblong; pn. lanceolate-acuminate, rachis *not winged;* pnl. lance-linear, cut-pinnatifid; segments minute, sharply 2-toothed; sori oblong, curved, finally confluent. Moist woods.

10 A. GOVINGIÀNA. Slender and weak (in conservatories), 1f, lanceolate-acuminate; pn. lanceolate, long-pointed, stalked; rach. winged; seg. acute, sharp-serrate; sori oblong.

11 A. BELÁNGERI. Fronds lance-linear, 1—2f × 2—3′, pinnate with deeply pinnatifid pinnæ, segments linear, small, and very numerous, each with a sorus. From Java. Stipe stout, green. The upper base (or axillary) segments are 2-parted.

12 A. BULBÍFERUM. Frond lanceolate, bipinnate, 1—3f; pn. lanceolate from a broad base, deeply pinnatifid; seg. oblong, cut-lobed and toothed, bearing 1—6 bold sori,—1 to a lobe. Often produces young plants from bulblets on the upper surface. N. Hol.

29. CAMPTOSÒRUS, Link. WALKING FERN. Frond lanceolate, entire, or pinnatifid, with the apex prolonged and inclined to root. Veins more or less netted. Sori oblong, irregularly scattered, with the indusia lateral on the veinlets. (Antigramma, C-B.)

1 **C. rhizophyllus** Lk. Frond 6—12′, subentire, at base stipitate, cordate, or truncate, or somewhat auriculate, the apex attenuated in a long thread-like acumination, arched, and rooting at the point. Rocky woods. Not common.

2 **C. pinnatífida** (Nutt). Frond 4—8′, abrupt at base, pinnatifid, with a long attenuated apex inclined to root; sori large, at length confluent. Pa. to Tenn. Rare.

β ***ebenoides.*** Frond at base pinnate; stipe black and polished. Near Phila.

30. **SCOLOPĔNDRIUM,** Smith. HART'S-TONGUE. Sori linear, transverse, scattered; indusium double (arising from 2 contiguous parallel veins), occupying both sides of the sorus, opening lengthwise along the middle.

S. officinàrum Willd. Frond simple, ligulate, acute, entire, cordate at base, 8—15′; stipe chaffy, 3—5′. Shady rocks, Chittenango, N. Y. (Sartwell).

31. **WOŎDSIA,** Brown. ROCK POLYPOD. Sori roundish, scattered; indusium fixed beneath the sorus, early opening above it, with a multifid or fringed margin, including the pedicellate spore-cases, like a calyx. Small, tufted ferns, with pinnated fronds.

§ Indusium closed over the sorus at first, toothed when open..................No. 1
§ Indusium concealed under the sorus, fringed with ciliæ...................Nos. 2—4

1 **W. obtùsa** Torr. Fronds 6—12′, lance-oblong, smoothish, almost tripinnate; pn. distant, sessile; segments pinnatifid, lobes rounded, toothed, each bearing a round fruit-dot, which dots at length almost meet. Rocks and cliffs. Vt. to Car., and W.

2 **W. ilvénsis** Br. Frond 4—7′, lanceolate, *bipinnate*, the stipe, rachis, mid-veins and their bristly chaff rust-colored; pn. oblong-obtuse, sessile, with 13—17 obtuse, subentire segments. Dry or rocky woods, in tufts. Stipe as long as the frond.

3 **W. glabélla** Br. Frond glabrous, lance-linear, 2—5′, *pinnate;* pn. ovate, very obtuse, 2—4″, 3-7-lobed, the upper only crenate. Cliffs, N. Y., Vt., and N. No chaff.

4 **W. Oregàna** Eaton. Frond glabrous, lance-elliptic, 2—8′, *pinnate;* pn. pinnatifid, obtuse; segments ovate, obtuse, denticulate; indusia with very short ciliæ. L. Sup.

32. **CISTÓPTERIS,** Bernh. BLADDER FERN. Sori roundish. Indusium hood-shaped, vaulted, fixed by the broad base (or by the base and sides), soon opening toward the forward end of the frond and thrown off. —Delicate Ferns, 2-3-pinnate.

1 **C. frágilis** Bernh. Frond lance-oblong, 6—10′, on a slender stipe of the same length, with open divisions; pn. lance-ovate; segments pinnatifid below, only serrate above, oblong, with prominent veins and 4—10 sori. Shady rocks. Common.

2 **C. bulbífera** Bernh. Frond long-lanceolate, 12—18′, the stipe shorter; pn. triangular-ovate, the lowest pair longest; segments oblong, obtuse, pinnatifid below, toothed above, 1 sorus to each lobe. Bears some bulblets. Shades.

33. **ASPĬDIUM,** L. SHIELD FERN. Sori orbicular, scattered, terminal or lateral on the pinnate veins. Indusium orbicular, peltate or reniform with a deep sinus, covering the sorus, opening all around.

§ ASPIDIUM. Indusium round, entire, centrally peltate. Pinnæ mostly auricled on the upper side at base.—*x* Fronds simply pinnate..............................Nos. 1—4
—*x* Fronds bipinnate....................................Nos. 5, 6

§ NEPHRODIUM. Indusium roundish, with a sinus on one side (subreniform)...(*a*)
a Frond simply pinnate, with a few large pinnæ. Cultivated... ....No. 7
a Frond once-and-a-half pinnate.—*y* Segments thin, quite entire............Nos. 8—11
—*y* Segments thick, finely serrate........Nos. 12, 13
a Frond twice pinnate.—*z* Segments bluntly lobed, or crenate or entire...Nos. 14, 15
—*z* Segments sharply serrate, or lobed or toothed..Nos. 16, 17

1 **A. acrostichoìdes** Swtz. Frond narrow-lanceolate, 15—18′; stipe chaffy; pn. falcate-lanceolate, ciliate-serrulate, 1—2′, auriculate on the upper side at base, the upper covered with fruit, smaller than the sterile. Rocky shades. Common.

*β. **incisum.*** Segments incised and sharp-toothed, most of them fertile. N. Y., &c.

2 **A. Lónchitis** Sw. Frond linear-lanceolate, rigidly erect, 8—18′; pn. triangular-ovate, auricled on the upper side at base, longest (1′) in the middle, gradually lessened to apex and base, all densely fertile. Lake Superior, and N.

3 **A.** MUNÌTUM. A splendid Fern from California, growing in clumps, 3—5f, smooth. rigid, evergreen, lance-linear; segm. oblong-falcate, spinulous-serrate; sori 2-rowed.

4 **A.** FALCÀTUM. Frond thick, rich green, lanceolate, pinnate, 2—3f high, with ample. lance-acuminate pinnæ. A noble, hardy Fern from Japan.

5 **A. Floridànum** (Hook). Rigidly erect, lance-oblong, pinnate and barren below, bipinnate, fertile, and contracted above; lower pinnæ cut-pinnatifid; indusia large, *round, peltate*, as in No. 1. Ga., Fla., La. (A. Ludoviciàna C-B.)

6 **A. aculeàtum** Sw. *β. **Braunii.*** Fronds in tufts, dark green, 2—3f, pinnate, lanceolate, narrowed both ways; stipe short, shaggy with large scales; segm. ovate-falcate, auricled on the upper side, bristle-tipped. Mts., Vt. (Eaton), N. Y.

7 **A.** PODOPHYLLUM (or SIEBÓLDII). Fronds of two forms, thick, smooth, pinnate, with a few large oblong pinnæ, in the fertile contracted and covered with sori. China.

8 **A. Thelýptera** Sw. *Lady Fern.* Frond lance-ovate, 10—16′; pn. narrow, distant, deeply pinnatifid, the lowest pair as long as any; margins reflexed in fruit.

9 **A. Novaboracénse** Willd. *New York Fern.* Frond elliptic-lanceolate, 12—18′; pn. narrow, gradually shortening from the middle both ways; segm. oblong, obtuse, flat; sori close to the margin, at length confluent. Moist woods: com. Delicate.

10 **A. patens** Sw. Frond soft and thin, downy with rusty hairs, lance., 12—18′: pn. linear-oblong, pinnatifid; segm. oblong, obtuse, entire; sori scattered. Dry, Fla.

11 **A.** MOLLE, from S. Afr. and S. Am., is divided just like A. patens, and equally hairy. but is larger, finer, with straw-colored stipes, and the sori in regular marginal rows.

12 **A. cristàtum** Sw. Frond narrowly lanceolate, some 2f × 6′; pn. deeply pinnatifid, triangular-oblong or -ovate, acute; segm. toothed, bearing a single row of large sori each side of the mid-vein. A beautiful dark-green Fern, common in woods.

13 **A. Goldiànum** Hook. Frond oval or ovate, about 15 × 10′, stipe same length; pn. broad (1½—2′), deeply pinnatifid; segm. subfalcate, crenate. Woods, E. and W.

14 **A. fragrans** Sw. Fronds linear-lanceolate, 6—12′, tapering both ways, bipinnate; stipe short, chaffy; pn. ovate-oblong, 1—10″; segm. lin.-oblong, with a dozen roundish crenatures or lobes; sori confluent. Rocks, Northern Mich. and Wis.

15 **A. marginàle** Sw. Fern ovate to lance-ovate, thick, glabrous, 1—2f, bipinnate; stipe very chaffy at base; pn. lanceolate; segm. oblong-falcate, obtuse and entire at apex, the lower crenate-lobed; sori round, at or near the margin. Rocky woods.

16 **A. Filix-mas.** Fern lanceolate, 1—3f; stipe very chaffy; pn. triangular-lance.; segm. oblong, obtuse, serrate at apex; sori near the mid-vein. N. J. to Va.? N. W.

17 **A. spinulòsum** Willd. Stipe elongated, soon smooth, the chaff deciduous; frond 1—2f, ovate, acuminate, nearly or quite tripinnate; pinnæ lanceolate, acuminate, the lower longest; pnl. oblong, acutish, segm. mucronate-serrate. Woods and pastures.

*β. **dilatàtum.*** Stipe permanently chaffy; frond triangular-ovate; pnl. obtuse

*γ. **Boottii.*** Stipe chaffy; frond oblong-lanceolate; pnl. rather acute.

LATIN INDEX:

INCLUDING ALSO A GLOSSARY OF THE GENERA.

Abelmoschus, 62. From the *Arabic;* a grain of musk.
Abies, 313. The ancient name.
Abronia, 279. *Greek*, delicate.
Abrotanum, 184. *Absinthium*, 184.
Abutilon, 61. Name of obscure origin.
Acacia, 99. *Gr.*, to sharpen; sc. the spines.
Acalypha, 296. *Gr.* word for the Nettle.
ACANTHACEÆ, 233.
Acanthus, 233. Classic for spine or thorn.
Acer, 74. The ancient name, sharp or strong.
Acerates, 273. *Gr.*, without horns.
Achæta, 178. *Gr.*, without chaff.
Achillæa, 183. Named for Achilles.
Achimenes, 219. Meaning unknown.
Acmella, 180. *Gr.*, a point; sense doubtful.
Acnida, 289. *Gr.*, negative of *stinging*.
Aconitum, 22. The ancient Greek name.
Acorus, 318. *Gr.*, a remedy for sore eyes.
ACROGENÆ, 360.
Acrostichum, 367. *Gr.*, a row at the top?
Actæa, 23. *Gr.*, resembling the Elder.
Actimeris, 178. Altered from the next.
Actinomeris, 178. *Gr.*, partly radiate.
Actinospermum, 182. *Gr.*, seed pappus radiate.
Adenocaulon, 160. *Gr.*, with stipitate glands.
Adiantum, 370. *Gr.*, not wetted by rain.
Adlumia, 33. Named for *John Adlum*.
Adonis, 19. Sacred to Adonis.
Æschynomene, 87. *Gr.*, modest, or sensitive.
Æsculus, 74. Name ancient and obscure.
Æthusa, 140. *Gr.*, to burn; poisonous.
Agapanthus, 345. *Gr.*, a lovely flower.
Agathæa, 160. *Gr.*, good, or excellent.
Agave, 333. *Gr.*, admirable.
Ageratum, 156. *Gr.*, fadeless; long in flower.
Agrimonia, 108. *Gr.*, prize of the field?
Agrostemma, 54. *Gr.*, crown of the field.
Agrostis, 357. *Gr.*, of the field.
Ailanthus, 72. *Chinese;* tree of Heaven.
Aira, 358. *Gr.*, a weapon; misapplied.
Albizzia, 82. For an Italian botanist.
Alchemilla, 108. *Arabic. 'alkémelya.*
Aletris, 335. *Gr.*, a miller's wife; sc. mealy.
Alisma, 323. *Celtic. alis*, water.
ALISMACEÆ, 322.
Allamanda, 271. To Dr. Allamand, of Leyden.
Allium, 343. *Celt.*, *all.* hot or burning.
Allosorus, 369. *Gr.*, changing sorus, or sori.
Alnus, 308. *Celt.*, *al lan*, near the river.
Alonsoa, 222. To Zanoni Alonso.
Alopecurus, 358. *Gr.*, fox-tail.
Aloysia, 236. To Maria Louisa, Queen of Spain.
Alpinia, 331. To P. Alpini, an Ital. botanist.
Alsine, 56. *Gr.*, in the grove.
Althæa, 60. *Gr.*, to cure; sc. medicinal.
Alyssum, 40. *Gr.*, allaying anger.
AMARANTACEÆ, 288.
Amarantus, 288. *Gr.*, unfading.
AMARYLLIDACEÆ, 332.
Amaryllis, 333. Dedicated to that nymph.
Amblygonum, 282. *Gr.*, around the joints; sc. ochreæ.
Ambrosia, 174. *Gr.*, food of the gods.
Amelanchier, 110. The French name.
Amianthium, 348. *Lat.*, flowers pure, or white.
Ammannia, 124. To John Ammann, a Russian.
Ammobium, 186. *Gr.*, living in sand.
Amorpha, 93. *Gr.*, formless or deformed.
Ampelopsis, 78. *Gr.*, resembling the Vine.
Amphianthus, 228. *Gr.*, flowers of two forms.
Amphicarpæa, 97. *Gr.*, fruit of two forms.
Amphicarpum, 358. *Gr.*, fruit of two forms.
Amsonia, 270. To Chas. Amson, of S. C.
Amygdalus, 102. The ancient name.
Amyris, 72. *Gr.*, myrrh; perfumed gum.
ANACARDIACEÆ, 72.
Anacharis, 324. *Gr.*, uncomely.
Anagallis, 213. *Gr.*, laughing, cheering.
Ananassa, 335. The name in Guiana is *anas*.
Anantherix, 273. *Gr.*, beardless.
Anchusa, 252. A name of obscure origin.
Andromeda, 201. Like Andromeda of old, bound by the waters' edge.
Andropogon, 359. *Gr.*, a man's beard.
Androsace, 211. *Gr.*, a man's buckler.
Aneimia, 367. *Gr.*, naked; sc. the inflorescence.
Anemone, 17. *Gr.*, wind; or Wind-flower.
Anethum, 136, 139. *Gr.*, burning, stimulating.
Angelica, 137. Name of excellence.
ANGIOSPERMÆ, 15.
ANONACEÆ, 26.
Antennaria, 185. *Lat.*, antennæ; alluding to the bristles of the pappus.
Anthemis, 183. Flowering abundantly.
Anthoxanthum, 358. *Gr.*, yellow flower.
Antigramma, 372. *Gr.*, like writing.
Antirrhinum, 223. *Gr.*, like the nose.
Anychia, 57. Altered from Paronychia.
APETALÆ, 278.
Aphyllon, 217. *Gr.*, without leaves.
Apium, 140. *Celt.*, *apon*, water.
Aplectrum, 328. *Gr.*, without a spur.
APOCYNACEÆ, 269.
Apocynum, 270. *Gr.*, repelling dogs.
Apogon, 190. *Gr.*, without beard; no pappus.
Apteria, 325. *Gr.*, without wings.
AQUIFOLIACEÆ, 207.
Aquilegia, 22. *Lat.*, an eagle; petals like eagles' talons.
Arabis, 37. Originally from Arabia.
ARACEÆ, 317.
Arachis, 87. *Gr.*, without branches.
Aralia, 142. Of unknown meaning.
ARALIACEÆ, 142.

Archangelica, 137. Name of excellence.
Archemora, 136. A fanciful name.
Arctostaphylos, 201. *Gr.*, Bear's Grape.
Arcyphyllum, 96. *Gr.*, arched leaf.
Arenaria, 55, (57). *Lat.*, a sand plant.
Arethusa, 331. Named for that nymph.
Argemone, 32. Remedy for sore eyes.
Arisæma, 318. Of unknown meaning.
Aristida, 358. *Lat.*, an ear of wheat.
Aristolochia, 278. *Gr.*, good in parturition.
ARISTOLOCHIACEÆ, 278.
Armeniaca, 102. Originally from Armenia.
Armeria, 215. Latin for the Sweet-William.
Armoracia, 41. Native of Armorica.
Arnica, 188. *Lat.*, lamb's skin.
Aronia, 112. [the staminate spikes awned.
Arrhenatherum, 358. *Gr.*, male—point—*i. e.*,
Artemisia, 184. To Artemis,=Diana.
ARTOCARPEÆ, 298.
Arundinaria, 358. Altered from the next.
Arundo, 359. *Lat.*, a reed. *Celt.*, *arn*, water.
Asarum, 378. Meaning unexplained.
ASCLEPIADACEÆ, 271.
Asclepias, 272. *Lat.*, Æsculapius.
Ascyrum, 48. *Gr.*, soft to the touch.
Asimina, 26. Of unknown meaning.
Asparagus, 347. *Gr.*, tearing; some are thorny.
ASPHODELEÆ, 341. [indusium.
Aspidium, 373. *Gr.*, a little shield; sc. the
Asplenium, 372. *Gr.*, without the spleen.
Aster, 161. *Lat.*, a star.
ASTEROIDEÆ, 152.
Astilbe, 114. *Gr.*, not shining; opaque.
Astragalus, 94. *Gr.*, the vertebra.
Atragene, 16. *Gr.*, night-born.
Atriplex, 287. *Lat.*, black and straggling.
Atropa, 264. To Atropos, one of the Fates who
AURANTIACEÆ, 71. [cut the thread of life.
Avena, 358. *Celt.*, *atan*, to eat?
Ayenia, 63. To the Duke of Ayen.
Azalia, 203. *Gr.*, arid; grows in dry places.
Azolla, 361. *Gr.*, killed by drought.
Baccharis, 171. Dedicated to Bacchus.
Baldwinia, 182. To Dr. Wm. Baldwin.
Ballota, 248. *Gr.*, to cast away; ill-scented.
BALSAMINEÆ, 67.
Baptisia, 84. *Gr.*, to dye,=to color.
Barbarea, 39. Dedicated to St. Barbara.
Bartonia, 268. To Dr. B. S. Barton, of Phila.
Batatas, 259. Indian name of Potato.
Batis, 303. The Indian name.
Batrachium, 19. *Gr.*, the frog; amphibious.
Begonia, 131. To Michael Begon, French, a
BEGONIACEÆ, 131. [promoter of Botany.
Bejaria, 204. To M. Bejar, a Spanish botanist.
Bellis, 165. *Lat.*, *bellus*, pretty.
Benzoin, 290. Fragrant like *benzoin*.
BERBERIDACEÆ, 27.
Berberis, 27. The ancient *Arabic* name.
Berchemia, 77. To M. Berchem, a French bot.
Berlandiera, 173. To M. Berlandier, French.
Beta, 285. *Celt.*, *bett*, signifying red.
Betonica, 249. *Celt.*, beutonic.
Betula, 308. From *betu*, its Celtic name.
BETULACEÆ, 307.
Bidens, 180. *Lat.*, two-toothed; sc. the seed.
Bigelovia, 169. To Dr. Jacob Bigelow, Boston.
Bignonia, 218. To Abbe Bignon, librarian to
BIGNONIACEÆ, 218. [Louis XIV.
Biotia, 161. *Gr.*, *bioö*, to live.
Blechnum, (369) 371. *Gr.*, *blechnon*. [calyx.
Blephilia, 245. *Gr.*, eyelash; sc. the fringed
Bletia, 328. To Louis Blet, a Spanish botanist.
Blitum, 285. *Gr.*, *bliton*,=insipid. [M. D.
Bocconia, 32. To Paolo Boccone, a Sicilian
Bœhmeria, 300. To G. R. Bœhmer, German.
Bœrhaavia, 279. To Boerhaave, of Holland.
Boltonia, 167. To J. B. Bolton, an English bot.
BORRAGINACEÆ, 250. [ing?
Borrago, 251. Altered from *cor ago*=nourish-
Borreria, 147. To J. W. Borrer, F. L. S.
Borrichia, 171. To Olof Borrich, Danish.
Botrychium, 366. *Gr.*, a cluster of grapes.
Boussingaultia, 285. To J. B. Boussingault, a
Bouteloua, 359. [cel. German naturalist.
Bouvardia, 170. To Dr. Bouvard, of Paris.
Boykinia, 116. To Dr. Boykin, of Georgia.
Brachychæta, 166. *Gr.*, short hair; sc. pappus.
Brasenia, 29.
Brassica, 40. *Brassic* was the Celtic name.
Brickellia, 158. To Dr. Brickell, of Savannah.
Briza, 358. *Gr.*, to nod; sc. the spikelets.
Brizopyrum, 358. Briza and *pyros* (wheat).
BROMELIACEÆ, 335. [the Wild Oat.
Bromus, 358. *Gr.*, food; anciently applied to
Broussonetia, 299. To P. N. V. Broussonet, Fr.
Browallia, 221. To J. Browallius, of Abo.
Brunella, 246. *German*, a throat-disease.
Brunfelsia, 221. To Otho Brunsfels, of Mentz.
Brunnichia, 279. To F. Brunnich, Danish.
Bryonia, 131. *Gr.*, to grow (sc. rapidly).
Bryophyllum, 119. *Gr.*, growing from the leaf.
Buchnera, 230. T. J. G. Buchner, German.
Buckleya, 291. To S. B. Buckley, Texas.
Bumelia, 210. Greek name of the Ash.
Bupleurum, 138. *Gr.*, ox-rib.
Burmannia, 225. To one Burmann, German.
BURMANNIACEÆ, 225.
Bursera, 72 To Joachim Burser, Naples.
BURSERACEÆ, 72.
BUTTOMEÆ, 323.
Buxus, 298. *Gr.*, dense? sc. the wood.
CABOMBEÆ, 28. Cabomba, 29.
Cacalia, 186. *Gr.*, exceedingly pernicious.
CACTACEÆ, 132.
Cakile, 43. The Arabic name.
Caladium, 319. Altered from Calla.
Calamagrostis, 357. Calamus-Agrostis.
Calamintha, 243. *Gr.*, beautiful Mint.
Calampelis, 219. *Gr.*, pretty vine.
Calandrinia, 59. To J. L. Calandrini, Italian.
Calceolaria, 222. *Lat.*, a little slipper.
Calendula, 188. *Lat.*, *kalendæ*, the first of the
Calla, 318 (319). *Gr.*, beautiful. [month.
Calliastrum, 161. *Gr.*, beautiful flower.
Callicarpa, 236. *Gr.*, beautiful fruit.
Callirrhoë, 60, 61. A Greek name.
Callistachys, 100. *Gr.*, beautiful spike.
Callistemon, 122. *Gr.*, beautiful stamens.
Callistephus, 165. *Gr.*, beautiful crown.
CALLITRICHACEÆ, 301.
Callitriche, 301. *Gr.*, beautiful hair.
Calluna, 200. *Gr.*, to sweep; sc. a broom.
Calochortus, 343. *Gr.*, beautiful grass.
Calonyction, 260. *Gr.*, "good-night."
Calophanes, 234. *Gr.*, appearing beautiful.
Calopogon, 330. *Gr.*, beautiful beard.
Caltha, 21. Syncope for *calathos*, a goblet.
CALYCANTHACEÆ, 25.
Calycanthus, 25. *Gr.*, calyx flower.
Calycocarpum, 27. *Gr.*, calyx fruit.
Calypso, 326. Dedicated to that nymph.
Calyptranthes, 123. *Gr.*, calyptra flower.
Calystegia, 260. *Gr.*, calyx covered.
Camassia, 343. *Indian*, Quamass.
Camelina, 42. *Gr.*, dwarf Flax.

Camellia, 65. To Geo. J. Kamel, a Moravian
CAMELLIACEÆ, 64. [monk.
Campanula, 196. *Lat.*, a little bell.
CAMPANULACEÆ, 196.
Camptosorus, 372. *Gr.*, curved sorus.
CANELLACEÆ, 8.
Canna, 332. Celtic for cane or mat.
Cannabis, 301. The ancient name.
CAPPARIDACEÆ, 44.
Capparis, 44. Arabic for capers.
CAPRIFOLIACEÆ, 144.
Caprifolium, 145. *Lat.*, goat-leaf.
Capsella, 42. *Lat.*, a little capsule. [qualities.
Capsicum, 263. *Gr.*, to bite; sc. its pungent
Cardamine, 37. *Gr.*, heart-subduing.
Cardiospermum, 75. *Gr.*, heart-seed.
Carex, 356. *Lat.*, to want; upper spike want-
Cariceæ, 356. [ing seed.
Carphephorus, 156. *Gr.*, chaff-bearing.
Carpinus, 307. *Celtic*, head-wood; sc. good
Carthamus, 189. *Arab.*, to color. [for yokes.
Carum, 138. From Caria, in Asia Minor.
Carya, 304. *Gr.*, the walnut.
CARYOPHYLLACEÆ, 52.
Cassia, 83. *Heb.*, ketzioth; *Lat.*, cassia.
Cassiope, 201. *Gr.*, the mother of Andromeda.
Cassyta, 290. [Thessaly.
Castanea, 306. From Castanea, a province in
Castilleja, 232. To Don Castilleja, a Spanish
Catalpa, 218. The Indian name. [botanist.
Catananche, 192. *Gr.*, from necessity (must
be admired).
Caulophyllum, 27. *Gr.*, stem-leaf.
Ceanothus, 77. *Gr.*, to prick; plant spiny.
Cedronella, 246. *Gr.*, fragrant like cedar.
Cedrus, 314. From the river Cedron, in Judæa.
CELASTRACEÆ, 75. [all winter.
Celastrus, 76. *Lat.*, winter; the fruit remains
Celosia, 288. *Gr.*, burnt; appearance of the fls.
Celtis, 299. Ancient name for the Lotus.
Cenchrus, 358. *Gr.*, oriental name of Millet.
Centaurea, 188. To the centaur Chiron.
Centradenia, 123. *Gr.*, spur-gland; sc. the ap-
Centrosema, 98. [pendages of the anthers.
Centunculus, 213. Ancient Latin name.
Cephalanthus, 150. *Gr.*, head-fl.; fls. in a head.
Cerastium, 54. *Gr.*, a horn; the shape of the
capsules. [native region.
Cerasus, 102. From Cerasus, in Pontus, its
Ceratiola, 303. *Gr.*, a little horn; sc. the
CERATOPHYLLACEÆ, 302. [stigma.
Ceratophyllum, 302. *Gr.*, horn-leaf. [fruit.
Ceratoschænus, 356. *Gr.*, horn-rush; sc. the
Cercis, 83. *Gr.*, a shuttle; sc. the legume.
Cereus, 133. *Lat.*, wax; the shoots are plastic.
Cestrum, 265. *Gr.* name for Betony.
Chærophyllum, 137. *Gr.*, rejoice, leaf; lvs. fra-
Chamælirium, 349. *Gr.*, dwarf lily. [grant.
Chamæmelum, 183. The Greek name.
Chamærops, 317. *Gr.*, dwarf stem. [ist.
Chaptalia, 194. To M. Chaptal, a French chem-
Chapmania, 87. To Dr. A. W. Chapman, the
CHARACEÆ, 14. [Southern botanist.
Cheilanthes, 370. *Gr.*, lip-flower; sc. the in-
Cheiranthus, 38. *Gr.*, hand-flower. [dusium.
Chelidonium, 31. *Gr.*, a swallow; flowers
with the arrival of that bird.
Chelone, 224. *Gr.*, tortoise; form of the
CHENOPODIACEÆ, 284. [flower.
Chenopodina, 287. Altered fr. Chenopodium.
Chenopodium, 285. *Gr.*, goose-foot; shape of
the leaf. [ter-green.
Chimaphila, 206. *Gr.*, lover of winter; win-
Chiococca, 147. *Gr.*, winter-berry.
Chiogenes, 199. *Gr.*, winter-born.
Chionanthus, 276. *Gr.*, snow (white) flower.
Chloris, 359. *Gr.*, green.
Chorozema, 100. *Gr.*, dance, drink; found
near a spring in a thirsty land—N. Holland.
Chrysanthemum, 184. *Gr.*, golden flower.
Chrysobalanus, 101. *Gr.*, golden acorn, or fr.
Chrysogonum, 172. *Gr.*, golden joint; fls. in
the axils.
Chrysopsis, 170. *Gr.*, golden appearance.
Chrysosplenium, 113. *Gr.*, golden spleen (wort).
Chthamalia, 274. *Gr.*, on the ground; trailing.
Cicer, 85. *Gr.*, strength; its nourishing quali-
CICHORACEÆ, 152. [ties.
Cichorium, 190. Greek name, adopted from the
Cicuta, 140. Name unexplained. [Egyptians.
Cimicifuga, 23. *Gr.*, bug-repelling.
Cineraria, 160. *Lat.*, ashes; clothed with ash-
colored down.
Cinna, 357. An ancient name of a grass.
Circæa, 128. To the enchantress *Circe*.
Cirsium, 189. The old Greek name.
Cissus, 78. The Greek name for the Ivy.
CISTACEÆ, 47. [sium inflated.
Cistopteris, 373. *Gr.*, bladder fern; sc. indu-
Citharexylum, 225. *Gr.*, harp-wood; fiddle-
Citrullus, 130. Derived from the next. [wood.
Citrus, 71. From Citron, in Judæa.
Cladastris, 84. *Gr.*, brittle branches?
Cladium, 356. *Gr.*, a branch or twig.
Clarkia, 126. To Captain Clark, the pioneer
traveller in Oregon.
Claytonia, 59. To John Clayton, of Virginia.
Clematis, 16. *Gr.*, a tendril; the petioles act
Cleome, 41. *Gr.*, to shut; fls. closed. [as such.
Clethra, 204. The Greek name of the Alder.
Clianthus, 100. *Gr.*, the flower of glory.
Clintonia (195), 346. To Gov. De Witt Clinton,
Clitoria, 98. A fanciful name. [of N. Y.
Clusia, 8. To Charles de l'Ecluse, of Artois.
Cnicus, 189. *Gr.*, to prick.
Cnidoscolus, 296. *Gr.*, nettle-prickle.
Cobæa, 258. To B. Cobo, a Spanish botanist.
Cocculus, 27. *Lat.*, cochineal; berries red.
Coix, 359. A Greek name of a grass. [try.
Colchicum, 348. From Colchis, its native coun-
Coleus, 239. *Gr.*, a sheath; of the stamens.
Collinsia, 225. To Z. Collins, of Philadelphia.
Collinsonia, 241. To Peter Collinson, F. R. S.
Collomia, 259. *Gr.*, glue; referring to the seeds.
Colocasia, 319. [mens.
Colubrina, 76. *Gr.*, snake; the twisted sta
Colutea, 95. [character.
Comandra, 291. *Gr.*, hair stamens; see the
Comarum, 107. Greek name of the Arbutus.
COMBRETACEÆ, 12. [mous Dutch botanists.
Commelyna, 353. To J. and G. Commelyn, fa-
COMMELYNACEÆ, 353.
COMPOSITÆ, 152. [Bishop of London.
Comptonia, 309. To Henry Compton, Lord
CONIFERÆ, 312.
Conioselinum, 140. *i. e.*, Conium-Selinum.
Conium, 139. *Gr.*, dust; unexplained.
Conobea, 226. Name unexplained,
Conoclinium, 160. *Lat.*, conical receptacle.
CONOIDEÆ, 311.
Conopholis, 271. *Gr.*, scale, cone.
Conostylis, 334. *Gr.*, cone, style.
Consolida, 22. *Lat.*, styles all in one?
Convallaria, 364. *Lat.*, a valley.
Convolvulus, 260. *Lat.*, to entwine, or involve.
Conyza, 171. Unexplained.

Coptis, 21. *Gr.*, to cut; sc. the cleft leaves.
Corallorhiza, 328. *Gr.*, coral-root.
Corchorus, 64. *Gr.*, to purge; laxative.
Cordia, 250. To E. Cordius, a Germ. botanist.
Corema, 303. *Lat.*, a broom; sc. the habit.
Coreopsis, 178. *Gr.*, bug-like; sc. the seeds.
Coreandrum, 141. *Gr.*, bug; from the odor.
Corespermum, 287. *Gr.*, bug-seed.
CORNACEÆ, 142. [of the wood.
Cornus, 143. *Lat.*, a horn; from the hardness
Coronilla, 87. *Lat.*, a little crown.
Corydalis, 33. Greek name for Fumitory.
Corylus, 307. *Gr.*, a helmet; the involucrate fr.
Corythium, 332. *Gr.*, a helmet; sc. the flower.
Cosmanthus, 256. *Gr.*, elegant flower.
Cotula, 172. The old Latin name.
Cranichis, 329. Derivation uncertain.
Crantzia, 135. To Prof. Crantz, Eng.
Crassula, 119. *Lat.*, thick; leaves fleshy.
CRASSULACEÆ, 117. [ness of the wood.
Cratægus, 110. *Gr.*, strength; from the hard-
Crinum, 333. The Greek name of the Lily.
Crocus, 337. The name in *Chaldaic*.
Croomia, 339. To H. B. Croom, of Florida.
Crotalaria, 90. *Gr.*, a rattle; sc. the sds. in pod.
Croton, 297. *Gr.*, a tick; sc. the seeds.
Crotonopsis, 297. Croton-like.
CRUCIFERÆ, 34. [are in the sheaths.
Crypsis, 358. *Gr.*, concealed; as the flowers
CRYPTOGAMIA, 360. [the calyx).
Cryptotænia, 138. *Gr.*, concealed border (of
Ctenium, 359. *Gr.*, a comb; sc. the beard.
Cucumis, 131. *Lat.*, crooked? (fruit).
Cucurbita, 130. *Lat.*, crookedness; the fruit.
CUCURBITACEÆ, 129.
Cunila, 240.
Cuphea, 123. *Gr.*, curved; sc. the capsule.
Cupressus, 315. *Gr.*, equal growth; referring
CUPULIFERÆ, 304. [to the reg. branches.
Cuscuta, 260. Name from the Arabic.
Cyathea, 367. *Gr.*, little cup; sc. indusium.
CYCADACEÆ, 311.
Cycas, 312. A name in Greek for a Palm.
Cyclamen, 212. *Gr.*, circular; sc. the leaves.
Cycloloma, 285. *Gr.*, circle, border (of the cal.)
Cydonia, 112. From Cydon, in Crete.
Cynara, 188. *Gr.*, a dog; involucre spiny.
Cynodon, 359. *Gr.*,dog tooth; sc. the spikelets.
Cynoglossum, 251. *Gr.*, dog tongue; sc. the lvs.
Cynthia, 191. A name of Diana.
CYPERACEÆ, 355.
Cyperus, 356. A name of Venus.
Cypripedium, 326. *Gr.*, Venus' slipper.
Cyrilla, 205. To Dom. Cyrillo, M. D., Naples.
Cyrtanthera, 235. *Gr.*, curved flower.
Cytisus, 100. First found in Isl. Cythrus.
Dactylis, 358. *Gr.*, a finger; spikes digitate.
Dactyloctenium, 359. *Gr.* finger comb; the spikes digitate-pectinate.
Dahlia, 166. For A. Dahl, a Swedish botanist.
Dalea, 93. For Thos. Dale, an English botanist.
Dalibarda, 105. To Dalibard, a Fr. botanist.
Danthonia, 358. To M. Danthoine, a Fr. bot.
Daphne, 292. A *nymph* transformed by Apollo.
Dasystoma, 230. *Gr.*, hairy mouth; sc. the cor.
Datura, 266. From the Arabic, *Totorah*.
Daucus, 139. The Greek name.
Davallia, 371. M. Davall, a Swiss botanist.
Decumaria, 116. Lat., *decem*, ten; fls.10-parted.
Delphinium, 22. *Gr.*, a dolphin.
Dentaria, 37. *Lat.*, a tooth; the root toothed.
Desmanthus, 82. *Gr.*, bundle (of) flowers.
Desmodium, 88. *Gr.*, a bond; sc. the loment.
Deutzia, 116. For *Deutz*, a Dutch botanist.
DIALYPETALÆ, 15. [the pod.
Diamorpha, 119. *Gr.*, peculiarly formed; sc.
Dianthera, 234. *Gr.*, two anthers.
Dianthus, 52. *Gr.*, the flower of Jove.
Diapensia, 258. *Gr.*, flowers by 5's; 5-cleft.
Diarrhena, 358. *Gr.*, two rough (keels in the
Dicentra, 33. *Gr.*, two spurs. [pales.
Dicerandra, 242. *Gr.*, anthers two-horned.
Dichondra, 260. *Gr.*, two grains (carpels).
Dichromena, 356. *Gr.*, two-colored. [amist.
Dicksonia, 371. To Jas. Dickson, cryptog-
Dicliptera, 234. *Gr.*, double-valved (capsule).
Dictamnus, 70. Greek name of the Ash.
Didiplis, 124. *Gr.*, twice double.
Dielytra, 33. *Gr.*, two wings.
Diervilla, 146. To M. Dierville, M.D., French.
Digitalis, 228. *Lat.*, finger of a glove.
Digitaria, 358. *Lat.*, a finger; sc. the spikes.
Diodia, 149. *Gr.*, wayside (plants).
Dionæa, 51. A name of Venus.
Dioscorea, 338. To Pedacius Dioscorides, a
DIOSCOREACEÆ, 338. [Greek physician.
Diospyros, 209. *Gr.*, the pear of Jove.
Dipholis, 210. *Gr.*, two scales (bet. the petals).
Diphylleia, 28. *Gr.*, two-leaved.
Diplopappus, 165. *Gr.*, double pappus.
DIPSACEÆ, 151. [hold water.
Dipsacus, 151. *Gr.*, to thirst; the leaf-axils
Dipteracanthus, 234. *Gr.*, 2-winged Acanthus.
Dirca, 292. *Gr.*, a fountain.
Discopleura, 141. *Gr.*, disk, ribs (united).
Dodecatheon, 211. *Gr.*,twelve deities (flowers).
Dodonæa, 74. To R. Dodonæus, M. D.
Dolichos, 98. *Gr.*, long; sc. the twining stems.
Doodia, 371. To S. Doody, botanist, London.
Downingia, 195. To J. Downing, florist, &c.
Draba, 41. *Gr.*,, acrid or biting; sc. the leaves.
Dracocephalum, 246. *Gr.*, dragon head.
Dracopsis, 176. *Gr.*, dragon-like.
Dracunculus, 184. *Gr.*, little dragon.
Drosera, 51. *Gr.*, dew (-drops on the leaves).
DROSERACEÆ, 50.
Dryas, 105. *Gr.*, Oak nymph; sc. its leaves.
Dulichium, 356. First found on that island.
Duranta, 235. To Castor Durant, 1580.
Dysodia, 181. *Gr.*, ill-scented.
Eatonia, 358. To Prof. Amos Eaton, the well-
EBENACEÆ, 209. [known botanist.
Eccremocarpus, 218. *Gr.*, pendent fruit.
Echeveria, 119. To M. Echeveri, botanic artist.
Echinacea, 175. *Gr.*, hedgehog; sc. the spines.
Echinocactus, 133. *Gr.*, hedgehog cactus.
Echinocystis, 129. *Gr.*, hedgehog bladder; fr.
Echinodorus, 323. *Gr.*, hedgehog sac; carpels.
Echinospermum, 251. Hedgehog seed.
Echites, 271. *Gr.*, a viper; the smooth shoots.
Echium, 251. *Gr.*, a viper; sc. the seeds.
Eclipta, 172. *Gr.*, deficient; sc. no pappus.
Ehretia, 250. To D. G. Ehret, German artist.
ELÆAGNACEÆ, 292.
Elæagnus, 292. *Gr.*, the olive; resemblance.
ELATINACEÆ, 51.
Elatine, 51. *Gr.*, the fir; resemblance.
Eleocharis, 356. *Gr.*, marsh delight.
Elephantopus, 156. *Gr.*, elephant's foot.
Eleusine, 359. A name of Ceres.
Elliottia, 205. To Stephen Elliott, S. Car.
Ellisia, 254. To Joseph Ellis, F. R. S.
Elodea, 50. *Gr.*, a marsh. [in the sheath.
Elymus, 358. *Gr.*, enveloped; sc. the spike
Elytraria, 233. *Gr.*,enveloped; the fls.in bracts.
EMPETRACEÆ, 302.

Empetrum, 303. *Gr.*, on a rock.
ENDOGENÆ, 316.
Enslenia, 273. To Aloysius Enslen.
Epidendrum, 331. *Gr.*, on a tree.
Epigæa, 200. *Gr.*, on the earth; trailing.
Epilobium, 124. *Gr.*, on the pod (sc. the fls.)
Epiphegus, 217. *Gr.*, on the Beech (roots).
Epiphyllum, 132. *Gr.*, on a leaf (sc. the fls.)
EQUISETACEÆ, 263.
Equisetum, 263. *Lat.*, horse-hair.
Eragrostis, 358. *Gr.*, lovely grass.
Erectites, 186. *Gr.*, to trouble.
Erianthus, 359. *Gr.*, wool-flower.
Erica, 200. *Lat.*, the old name.
ERICACEÆ, 197.
Erigenia, 140. *Gr.*, spring-born.
Erigeron, 165. *Gr.*, in spring (early) old.
Eriocaulon, 355. *Gr.*, woolly stem.
ERIOCAULONACEÆ, 355.
Eriogonum, 280. *Gr.*, woolly joint.
Eriophorum, 356. *Gr.*, wool-bearing.
Erithalis, 147. *Gr.*, to grow green.
Ernodea, 147. *Gr.*, branched; much branched.
Erodium, 68. *Gr.*, a heron's (bill).
Erophila, 41. *Gr.*, lover of Spring.
Eryngium, 131. *Gr.*, to belch; a remedy.
Erysimum, 39. *Gr.*, to draw (blisters).
Erythræa, 267. *Gr.*, red; sc. the flowers.
Erythrina, 97. Same as the last.
Erythronium, 341. Ditto.
Escallonia, 116. To Escallon, Spanish.
Eschscholtzia, 32. To Eschscholtz, German.
Eucalyptus, 121. *Gr.*, well covered; sc. the cal.
Eugenia, 122. To Prince Eugene, of Savoy.
Eulophus, 141. *Gr.*, handsome crest.
Euonymus, [illegible] *Gr.*, well named.
Eupatorium, 158. Named for Eupator.
Euphorbia, 293. To Euphorbus, of Mauritania.
EUPHORBIACEÆ, 293.
Euphrasia, 232. To the Muse Euphrosyne.
Eustachys, 359. *Gr.*, handsome spike.
Eustoma, 267. *Gr.*, handsome mouth.
Eutoca, 255. *Gr.*, fruitful.
Euxolus, 288. *Gr.*, well closed.
Evolvulus, 260. *Lat.*, to roll out, to trail.
Excœcaria, 296. *Lat.*, to blind; the poisonous
EXOGENÆ, 15. [juice destroys the sight.
Exostemma, 147. *Gr.*, stamens exserted?
Faba, 85. *Gr.*, to eat.
Fabiana, 265. To F. Fabiana, of Valencia.
Fagopyrum, 284. *Gr.*, beech-nut wheat.
Fagus, 307. The ancient name.
Fedia, 151. From *fedus*, a kid.
Fenzlia, 257. To Dr. Fenzl, a botanic author.
Festuca, 358. Celt., *fest*, pasture.
FICOIDEÆ, 133.
Ficus, 299. The ancient Latin name.
Filago, 185. *Lat.*, thread-spinning; the plant
FILICES, 364. [is clothed in cotton.
Fimbristylis, 356. *Gr.*, fringed style.
Flœrkea, 68. To Flœrke, a German botanist.
FLORIDEÆ, 322.
Fœniculum, 139. *Lat.*, a kid; why?
Forestiera, 277. To M. Forestier, French.
Forsteronia, 270. To T. F. Forster, an Eng. bot.
Forsythia, 276. To Mr. Forsyth, horticulturist.
Fothergilla, 120. To J. Fothergill, M.D., Lond.
Fragaria, 106. *Lat.*, fragrant; sc. the fruit.
Francisea, 221. To Francis, Emperor of Aust.
Franklinia, 65. [plants in the South.
Frasera, 268. To John Fraser, collector of
Fraxinus, 277. *Lat.*, a hedge; hedge plants.
Fritillaria, 342. *Lat.*, a chess-board.
Frœlichia, 290. To J. A. Frœlich, a Germ. bot.
Fuchsia, 127. To Leonard Fuchs, German.
Fuirena, 356. To G. Fuiren, Danish.
Fumaria, 34. *Lat.*, smoke; sc. the smell.
FUMARIACEÆ, 33.
FUNGI, 14.
Funkia, 345. To Henry Funk, German.
Gaillardia, 181. To M. Gaillard, French.
Galactia, 97. *Gr.*, milk.
Galanthus, 334. *Gr.*, milk-flower.
Galax, 206. *Gr.*, milk; flowers milk-white?
Galeopsis, 248. *Gr.*, weasel-like; sc. the fl.
Galinsoga, 172. To M. Galinsoga, Madrid.
Galium, 148. *Gr.*, milk (to curdle).
GAMOPETALÆ, 144.
Gardoquia, 246. To Diego Gardoqui, Spanish.
Gaultheria, 201. To Dr. Gaulthier, Quebec.
Gaura, 126. *Gr.*, superb. [French chemist.
Gaylussacia, 198. To Gaylussac, the celebrated
Gazania, 181. *Lat.*, riches (richness).
Gelsemium, 269. Italian for Jessamine.
Genista, 90. Celt., *gen*, a bush.
Gentiana, 267. To Gentius, king of Illyria.
GENTIANACEÆ, 266.
GERANIACEÆ, 67.
Geranium, 68. *Gr.*, crane's (bill); sc. the fruit.
Gerardia, (230) 231. To John Gerard, English.
Gesneria, 219. To Conrad Gesner, German.
GESNERIACEÆ, 219. [of G. urbicum.
Geum, 105. *Gr.*, to give relish; sc. the roots
Gilia, 257. To P. S. Gill, Spanish.
Gillenia, 104. Named for A. Gille, German.
Ginkgo, 316. The name in Japanese.
Ginseng, 142. The name in Chinese.
Gladiolus, 338. *Lat.*, a little sword; sc. the lvs.
Glaucium, 31. *Gr.*, glaucous (in color).
Glaux, 212. Ditto.
Glechoma, 246. An old Greek name.
Gleditschia, 83. To Prof. G. Gleditsch, Berlin.
Glottidium, 93. *Gr.*, tongue; sc. the pods.
Gloxinia, 219. To P. B. Gloxin, of Colmar.
GLUMIFERÆ, 355.
Glyceria, 358. *Gr.*, sweet; sc. the herbage.
Gnaphalium, 185. *Gr.*, soft down.
Godetia, 126. To M. Godet, French.
Gomphrena, 289. *Gr.*, a club; sc. the flowers.
Gonolobus, 274. *Gr.*, angular pods.
GOODENIACEÆ, 10.
Goodyera, 330. To John Goodyer, English.
Gordonia, 65. To Alex. Gordon, London.
Gossipium, 63. *Arabic*, a softness.
GRAMINEÆ, 356.
GRAMINOIDEÆ, 355. [bearded at base.
Graphephorum, 358. *Gr.*, pencil-bearing; fls.
Gratiola, 227. *Lat.*, grace (medicinally).
GROSSULACEÆ (113).
Grossularia, 117. Name of doubtful meaning.
Guettarda, 147. To Etienne Guettard, French.
Guiacum, 67. The aboriginal name.
GUTTIFERÆ, 8.
Gymnadenia, 326. *Gr.*, naked gland.
Gymnocladus, 83. *Gr.*, naked branches.
Gymnogramma, 368. *Gr.*, naked writing (sori).
Gymnopogon, 359. *Gr.*, naked beard.
Gymnospermæ, 311. *Gr.*, naked seeds.
Gynandropsis, 44. *Gr.*, like gynandria.
Gynerium, 359. *Gr.*, style woolly.
Gypsophila, 53. *Gr.*, loving chalk (cliffs).
Habenaria, 326. *Lat.*, thong, = the long spur.
Habrothamnus, 265. *Gr.*, a gay branch.
HÆMODORACEÆ, 325.
Halenia, 268. A personal name.
Halesia, 209. To S. Hales, D. D., F. R. S.

HALORAGEÆ, 120.
HAMAMELACEÆ, 120.
Hamamelis, 120. *Gr.*, (flower) with the fruit.
Hamelia, 147. To H. L. Duhamel. [berg.
Hardenbergia, 99. To the Countess of Harden-
Hedeoma, 241. The Greek name for Mint.
Hedera, 142. *Celt.*, a cord.
Hedychium, 331. *Gr.*, sweet snow (white fls.)
Hedysarum, 87. An old Greek name.
Helenium, 181. Dedicated to Helen.
Helianthella, 177. Diminutive of Helianthus.
Helianthemum, 47. *Gr.*, Sun-flower.
Helianthus, 176. Ditto.
Helichrysum, 186. *Gr.*, golden sun.
Heliophytum, 251. *Gr.*, Sun-plant.
Heliopsis, 175. *Gr.*, sun-like.
Heliotropium, 250. *Gr.* turning (with) the sun.
Helleborus, 21. *Gr.*, killing (poisonous) food.
Helonias, 349. *Gr.*, a marsh.
Helosciadium, 140. *Gr.*, marsh umbel.
Hematelia, 367.
Hemerocallis, 345. *Gr.*, beauty of a day.
Hemicarpha, 356. *Gr.*, half (of the) chaff.
Hepatica, 18. *Gr.*, of or resembling the liver.
HEPATICÆ, 14.
Heracleum, 136. Sacred to Hercules.
Herpestis, 226. *Gr.*, a creeper.
Hesperis, 39. *Gr.*, the evening. [anthers.
Heteranthera, 350. *Gr.*, other (two kinds of)
Heterotheca, 170. *Gr.*, other (2 kinds of) fruits.
Heuchera, 115. To Dr. H. Heucher, Wittembg.
Hibiscus, 62. From *ibis*, the stork.
Hieracium, 101. Gr., *hierax*, the hawk.
Hierochloa, 358. *Gr.*, holy Grass.
HIPPOCASTANEÆ, 73.
Hippomane, 293. *Gr.*, horse madness.
Hippophæ, 293. *Gr.*, horse destroyer.
Hippuris, 121. *Gr.*, mare's tail.
Holcus, 358. *Gr.*, to extract (thorns).
Holosteum, 54. *Gr.*, all bone (by antithesis).
Honkenya, 56. A personal name.
Hordeum, 358. *Gr.*, heavy (sc. bread).
Hottonia, 211. To Prof. P. Hotten, of Leyden.
Houstonia, 149. To Wm. Houston, M. D., Eng.
Hoya, 275. To Thos. Hoy, F. L. S.
Hudsonia, 48. To Wm. Hudson, F. R. S.
Humea, 194. To Lady Hume, of Wormleybury.
Humulus, 301. *Lat.*, on the ground,=trailing.
Hyacinthus, 344. A boy killed by Zephyrus.
Hydrangea, 118. *Gr.*, a water-vessel.
Hydranthelium, 228. *Gr.*, a little water-flower.
Hydrastis, 23. In or near water.
HYDROCHARIDACEÆ, 324.
Hydrocleis, 323. *Gr.*, enclosed in water.
Hydrocotyle, 135. *Gr.*, a water-vessel.
Hydrolea, 255. *Gr.*, water, oil; sc. an oily
HYDROPHYLLACEÆ, 253. [water-plant.
Hydrophyllum, 254. *Gr.*, water leaf.
Hygrophila, 234. *Gr.*, loving moisture.
Hymenopappus, 181. *Gr.*, membranous pap-
Hyoscyamus, 264. *Gr.*, hog-bean. [pus.
Hypelate, 74. Unexplained.
HYPERICACEÆ, 48.
Hypericum, 49. Not satisfactorily explained.
Hypobrychia, 124. [the pod).
Hypoxis, 334. *Gr.*, sharp under; (the base of
Hyptis, 239. *Gr.*, resupinate: sc the cor. upper
Hyssopus, 241. The old Hebrew name. [lip.
Iberis, 42. From Iberia, now Spain.
Ilex, 207. The ancient name.
Illicium, 24. *Lat.*, alluring; sc. the perfume.
Ilysanthes, 227. *Gr.*, mud-flower. [touched.
Impatiens, 69. *Lat.*, impatient; not to be
Indigofera, 95. *Lat.*, indigo-bearing.
Inula, 171. A corruption of Hellenium.
Iodanthus, 36. *Gr.*, violet-flower.
Ipomæa, 259 (260). *Gr.*, like bindweed.
Ipomopsis, 257. *Gr.*, like Ipomæa.
Iresine, 289. Gr., *eiros*, wool.
IRIDACEÆ, 336.
Iris, 336. From its varied colors.
Isanthus, 239. *Gr.*, equal (regular) flower.
Isatis, 43. *Gr.*, to smooth (the skin); a cos-
Isoëtes, 360. *Gr.*, equal (all the) year. [metic.
Isopappus, 170. *Gr.*, equal pappus.
Isopyrum, 20. *Gr.*, equal wheat.
Itea, 117. Greek name of the Willow.
Iva, 174. Leaves resembling the Greek Iva.
Ixia, 337. *Lat.*, bird-lime; sc. sticky.
Jacquemontia, 258. To Victor Jacquemont.
Jasminum, 275. *Gr.*, violet smell; sc. fragrant.
Jatropha, 296. *Gr.*, physician, food; sc. medicinal.
Jeffersonia, 28. To President Thos. Jefferson.
JUGLANDACEÆ, 303. [walnut.
Juglans, 304. *Gr.*, the nut of Jove; sc. the
JUNCACEÆ, 350.
JUNCAGINEÆ, 323. [of these rushes.
Juncus, 351. *Lat.*, to join; ropes were made
Juniperus, 314. *Celt.*, rough or rude.
Jussiæa, 124. To Antoine Jussieu, the elder.
Justicia, 235. To J. Justice, a Scotch botanist.
Kallstrœmia, 67. A personal name.
Kalmia, 200. To Prof. Peter Kalm, of Abo.
Kennedya, 99. To Mr. Kennedy, of Hammersworth.
Kerria, 104. To Mr. Kerr, botanist, Ceylon.
Kœleria, 358. To Prof. Kœler, of Mayence.
Kœlreuteria, 75. To J. G. Kœlreuter, German
Kostelletzkya, 62. A personal name. [botanist.
Krameria, 80. To J. G. and W. H. Kramer, Ger.
Krigia, 191. To Dr. David Kreig, German.
Kuhnia, 158. To Adam Kuhn, of Pennsylvania.
Kuhnistera, 93. From Kuhnia.
Kyllingia, 356. To P. Kylling, Danish, 1690.
LABIATÆ, 237. LABIATIFLORÆ, 153, 155.
Laburnum, 91. The old Latin name.
Lachnocaulon, 355. *Gr.*, wool-stem.
Lachnanthes, 335. *Gr.*, wool-flower.
Lactuca, 193. Lat., *lac*,=milk; sc. milk-weed.
Lagenaria, 130. *Lat.*, a bottle; sc. the gourd.
Lagerstrœmia, 123. To Marcus Lagerstrœm,
Laguncularia, 122. *Lat.*, a small bottle. [Ger.
Lamium, 248. *Gr.*, throat; sc. gaping-flowers.
Lampsana, 190. A personal name.
Lantana, 237. Old Latin name for Laburnum.
Lapithœa, 266.
Laportea, 300. To M. Laporte, French.
Lappa, 190. Old Latin name of Burdock.
Larix, 314. *Celt.*, fat or resinous; from *lar*.
Lathyrus, 85. *Gr.*, stimulating.
LAURACEÆ, 290. [made of lavender.
Lavandula, 239. *Lat.*, to wash; from the use
Lavatera, 60. To the two Lavaters, of Zurich.
Leavenworthia, 38. To Dr. Leavenworth, U.S.A.
Lechea, 47. To G, Leche, Sweden, 1760.
Ledum, 204. An old Greek name. [nist.
Leersia, 357. To J. D. Leers, a German bota-
LEGUMINOSÆ, 80.
Leiophyllum, 204. *Gr.*, smooth leaf. [Florida.
Leitneria, 309. To Dr. Leitner, collector in
Lemna, 319. The Greek name of some water-
LEMNACEÆ, 319. [plant.
Lens, 100. The seeds are shaped like a *lens*.
LENTIBULACEÆ, 215.
Leonotis, 249. *Gr.*, lion's-ear; sc. the flowers.

Leontodon, 191. *Gr.*, lion's-tooth; sc. the lvs.
Leonurus, 249. *Gr.*, lion's-tail; sc. the spike
of flowers.
Lepachis, 176. From *lepis*, Gr. word for scale.
Lepidium, 42. *Gr.*, a little scale; sc. the sili-
Leptocaulis, 140. *Gr.*, slender stem. [cles.
Leptochloa, 359. *Gr.*, slender grass.
Leptopoda, 182. *Gr.*, slender foot or stem.
Leptosiphon, 257. *Gr.*, slender tube; sc. the
flowers.
Lepturus, 358. *Gr.*, slender tail; sc. the spikes.
Lepuropetalon, 115. *Gr.*, husk petal. [ida.
Lespedeza, 89. To M. Lespedez, Gov. of Flor-
Leucanthemum. 183. *Gr.*, white flower.
Leucas, 238. *Gr.*, whiteness; sc. of the flowers.
Leucojum, 334. *Gr.*, white violet.
Liatris, 157. A name unexplained.
LICHENES, 14.
LIGULIFLORÆ, 152, 155.
Ligusticum, 140. Originally found in Liguria.
Ligustrum, 276. Lat., *ligare*, to tie; sc. its
LILIACEÆ, 341. [flexible branches.
Lilium, 342. Celt., *li*, whiteness.
Limnanthemum, 268. *Gr.*, marsh-flower.
Limnanthes, 68. Ditto.
Limnobium, 324. *Gr.*, marsh-life.
Limnocharis, 323. *Gr.*, marsh-joy.
Limosella, 228. *Gr.*, little mud (plant).
LINACEÆ, 66. [resembles.
Linaria, 222. From Linum, flax; which it
Lindera, 290. Name unexplained.
Linnæa, 144. To the great naturalist, Carl von
Linum, 66. Celt., *lin*,=a thread. [Linnæus.
Liparis, 329. Gr., *liparos*, unctuous.
Lipocarpha, 356. *Gr.*, oil chaff; why?
Lippia, 236. To Aug. Lippi, French traveller.
Liquidambar, 120. *Lat.*, liquid amber.
Liriodendron, 25. *Gr.*, lily-tree; sc. tulip-tree.
Listera, 329. To Dr. Martin Lister, English.
Lithospermum, 252. *Gr.*, stone-seed.
Loasa, 128. Name unexplained.
LOASACEÆ, 128. [to James I.
Lobelia, 194. To Matthew Lobel, physician
LOBELIACEÆ, 194. [nist.)
LOGANIACEÆ, 269. (Jas. Logan, Eng. bota-
Loiseleuria, 203. A mythological name.
Lolium, 359. The Celtic name is *loloa*. [sori.
Lomaria, 369. *Gr.*, the edge; position of the
Lonicera, 145. To Adam Lonicer, Germ., 1580.
Lophanthus, 245. *Gr.*, crest-flower.
Lophiola, 335. *Lat.*, diminutive; little crest.
Lophospermum, 223. *Gr.*, crest-seed.
LORANTHACEÆ, 292. *Lorinseria*, 371.
Ludwigia, 127. To Prof. C. D. Ludwig, Leipsic.
Lunaria, 40. *Lat.*, the moon; sc. the silicles.
Lupinus, 90. *Lat.*, a wolf; devours the soil?
Luziola, 357. Lat., *lux*, light; sparkling with
Luzula, 351. *Germ.*, the glow-worm. [dew.
Lychnis, 54. *Gr.*, a lamp (wick).
Lycium, 264. The old Greek name.
Lycopersicum, 262. *Gr.*, wolf-peach.
LYCOPODIACEÆ, 361.
Lycopodium, 361 (362). *Gr.*, wolf-foot.
Lycopsis, 251. *Gr.*, wolf-like; the flower is
fancied to resemble a wolf's eye.
Lycopus, 240. *Gr.*, wolf-foot.
Lygodesmia, 193. *Gr.*, flexible band.
Lygodium, 366. *Gr.*, a flexible (vine).
Lysimachia, 212. *Gr.*, dissolution of strife;
LYTHRACEÆ. 123. [sc. loose-strife.
Lythrum, 123. *Gr.*, black blood; sc. purple.
Macbridea, 247. To Dr. Jas. McBride, of S. C.
Maclura, 299. To Wm. Maclure, Pennsylvania.
Macranthera, 230. *Gr.*, long anthers.
Macrotis, 23. *Gr.*, long ears; sc. racemes.
Madia, 173. The name in Chili.
Magnolia, 24. To Prof. Pierre Magnol, Mont-
MAGNOLIACEÆ, 24. [pelier, France.
Majanthemum, 346. *Lat.*, May-flower.
Malachodendron, 65. *Gr.*, Mallow-tree.
MALPIGHIACEÆ, 8.
Malus, 112. *Lat.*, the apple. [=soft.
Malva, 60. Altered from the Greek *malache*,
MALVACEÆ, 59.
Malvastrum, 61. From Malva.
Malvaviscus, 62. *Lat.*, glue mallow.
Mammilaria, 132. Lat., *mamma*, nipple; sc.
the protuberances. [Ayres.
Mandevilla, 271. To H. B. Mandeville, Buenos
Manisurus, 359. *Gr.*, lizard's-tail. [1550.
Maranta, 331. To B. Maranti, M. D., Venice,
Marrubium, 249. *Hebrew*, bitter juice.
Marshallia, 182. To Humphrey Marshall, Phila.
Marsilia, 360. To Count F. Marsigli, Bologna.
MARSILIACEÆ, 360. [bridge, 1765.
Martynia, 219. To Prof. John Martyn, Cam-
Maruta, 183. Meaning unexplained.
Matricaria, 183. An anatomical word. [1750.
Matthiola, 38. To Dr. P. A. Matthioli, Italy,
Maurandia, 223. To Prof. Maurandi, Cartha-
Mayaca, 354. Name unexplained. [gena.
Maytenus, 76. The Chilian name.
Meconopsis, 32. *Gr.*, poppy-like.
Medeola, 340. From Medea, the sorceress.
Medicago, 92. An ancient name. [(branches).
Melaleuca, 122. *Gr.*, black (trunk), white
Melampyrum, 223. *Gr.*, black wheat.
MELANTHACEÆ, 347.
Melanthera, 174. *Gr.*, black anthers.
Melanthium, 348. *Gr.*, black flower.
MELASTOMACEÆ, 122. [Ash.
Melia, 65. The Greek name for the Manna
MELIACEÆ, 65.
Melica, 358. *Italian*, from *mel*, honey.
Melilotus, 92. *Lat.*, honey lotus.
Melissa, 243. *Lat.*, a bee; yields honey.
Melocactus, 133. *Gr.*, melon cactus.
Melothria, 130. The old Greek name.
MENISPERMACEÆ, 26.
Menispermum, 36. *Gr.*, moon-seed.
Mentha, 240. Minthe, daughter of Cocyton.
Mentzelia, 128. To C. Mentzel, of Brandenburg.
Menyanthes, 268 (269). *Gr.*, moon-flower.
Menziesia, 201. To Archibald Menzies, F.L.S.
Mercurialis, 297. Dedicated to Mercury.
Mertensia, 253. To Prof. F. C. Mertens, Bremen.
Mesembryanthemum, 133. *Gr.*, mid-day flower.
Metastelma, 274. *Gr.*, with a girdle.
Micranthemum, 227. *Gr.*, minute flower.
Microstylis, 329. *Gr.*, minute style.
Mikania, 160. To Prof. Joseph Mikan, Prague.
Milium, 358. *Lat.*, a thousand (seeds).
Mimosa, 82. *Gr.*, a mimic; sc. its motions.
Mimulus, 226. *Gr.*, an ape; sc. its flowers.
Mimusops, 210. *Gr.*, ape-like.
Mirabilis, 279. *Lat.*, wonderful; sc. the fls.
Mitchella, 148. To Dr. John Mitchell, Va.
Mitella, 113. *Lat.*, a little mitre; sc. the fruit.
Mitreola, 269. Ditto.
Modiola, 61. *Lat.*, a little measure or cup.
Mœnchia, 56. To the Germ. botanist, Mœnch.
Mœringia, 55. To Dr. P. H. G. Mœhring, Germ.,
Mollugo, 58. Name applied by Pliny. [1730.
Moluccella, 248. Natives of the Moluccas.
Monarda, 245. To Dr. N. Monardez, Seville.
Moneses, 206. From *monos*,=one; sc. 1-fld.

Monotropa, 206. *Gr.*, one, turning; flowers
Montelia, 289. [turned one way.
Morinda, 147. *i. e.*, Indian Mulberry.
Morus, 300. *Celt.*, black; sc. the fruit.
Muhlenbergia, 357. To Rev. Henry Muhlen-
MULISIACEÆ, 153. [berg, D. D.
Mulgedium, 193. Meaning unknown.
Musa, 331. To Antonius Musa.
MUSACEÆ, 331.
Muscari, 344. From *moschus*, musk.
MUSCI, 14.
Myginda, 76. To Francis von Mygind, Germ.
Mylocarium, 205. *Gr.*, mill-nut; form of the fruit.
Myosotis, 252. *Gr.*, mouse-ear; sc. the lvs.
Myosurus, 20. *Gr.*, mouse-tail; sc. the torus.
Myrica, 309. *Gr.*, (On the banks of) flowing
MYRICACEÆ, 308. [(rivers).
Myriophyllum, 121. *Gr.*, a thousand leaves.
MYRSINACEÆ, 10. (*Gr.*, myrrh.)
MYRTACEÆ, 121.
Myrtus, 122. *Gr.*, perfume.
Nabalus, 192. The meaning unknown.
NAIADACEÆ, 320.
Najas, 320. *Gr.*, a water-nymph.
Napæa, 61. *Gr.*, dell-nymph. [on the nerves.
Narcissus, 332. From *narke*, stupor; its effect
Nardosmia, 160. *Gr.*, smell of nard, or spike-
Narthecium, 351. *Gr.*, a rod, or wand. [nard.
Nasturtium, 36. *Lat.*, twisted nose; on ac-
Naumbergia, 312. [count of its acridity.
Negundo, 74. Of unknown meaning.
Nelumbium, 29. Nelumbo is the *Cingalese*
Nemastylis, 337. *Gr.*, thread style. [name.
Nemesia, 222. An old name revived.
Nemopanthes, 208. *Gr.*, grove-flower.
Nemophila, 254. *Gr.*, loving the grove.
Nepeta, 245. From Nepet, a town in Tuscany.
Nephrodium, 373. *Gr.*, the kidney; sc. the sori.
Nephrolepis, 365. *Gr.*, kidney scale.
Neptunea, 82. Dedicated to Neptune.
Nerium, 271. *Gr.*, humid; sc. the habit.
Nesæa, 124. The name of a sea-nymph.
Neurophyllum, 136. *Gr.*, nerve-leaf.
Neviusia, 104. To Rev. R. Nevius.
Nicandra, 263. [duced tobacco into France.
Nicotiana, 265. To John Nicot, who intro-
Nierembergia, 264. To J. E. Nieremberg,
Nigella, 21. *Lat.*, black; the seeds. [Spanish.
Nolana, 262. *Lat.*, a little bell; sc. corolla.
Nolina, 343. To P. C. Nolin, American.
Notholæna, 368. *Gr.*, false cloak; the indusia.
Nuphar, 29. The Arabic name of Water-lily.
NYCTAGINACEÆ, 279.
NYMPHÆACEÆ, 28.
Nymphæa, 29. *Gr.*, a water-nymph.
Nyssa, 143. The name of a water-nymph.
Obione, 287. *Gr.*, a shield; the round leaves.
Obolaria, 263. *Gr.*, a piece of money.
Ocimum, 238. *Gr.*, to smell; strong-scented.
Œnothera, 125. *Gr.*, wine-hunting; incentive
OLACACEÆ, 10. [to wine-drinking.
Oldenlandia, 150. To H. B. Oldenland, Danish,
Olea, 276. The Greek name of the Olive. [1695.
OLEACEÆ, 275.
Omphalodes, 251. *Gr.*, navel-like.
ONAGRACEÆ, 124.
Oncidium, 328. *Gr.*, a tumor; sc. the form of the depressed stem.
Onoclea, 369. *Gr.*, closed vessel; sc. the fruit.
Onopordon, 189. *Gr.*, an ass, to explode; its supposed effects.
Onosmodium, 252. Compared to the Onosma.
Onychium, 372. *Gr.*, the finger nail; a fanciful name. [the frond.
Ophioglossum, 366. *Gr.*, serpent's tongue; sc.
Oplismenus, 358. *Gr.*, strong weapon; cock-
Opuntia, 132. From Opus, in Locris. [spur.
ORCHIDACEÆ, 325.
Orchis, 326. Name a physiological conceit.
Origanum, 242. *Gr.*, mountain joy.
Ornithogalum, 343. *Gr.*, bird milk.
OROBANCHACEÆ, 217. [sc. the Vetch.
Orobus, 100. *Gr.*, to excite (nourish) the ox;
Orontium, 318. Name adopted from the Greek.
Orthodanum, 96. *Gr.*, a true gift.
Oryza, 357. The Arabic name is *eruz*,=Rice.
Oryzopsis, 358. *Gr.*, Oryza-like,=Rice-like.
Osmanthus, 276. *Gr.*, fragrant flower.
Osmorhiza, 137. *Gr.*, fragrant root.
Osmunda, 366. *Osmunder* was a Celtic divinity.
Ostrya, 307. *Gr.*, a scale; sc. the scaly catkins.
Otophylla, 231. *Gr.*, ear-leaf.
OXALIDEÆ, 67. [taste.
Oxalis, 67. *Gr.*, acid; the plant has a sour
Oxybaphus, 279. *Gr.*, acid dye.
Oxycoccus, 199. *Gr.*, acid berry.
Oxydendrum, 203. *Gr.*, acid tree.
Oxyria, 280. *Gr.*, acid.
Pachysandra, 297. *Gr.*, thick stamens.
Pæonia, 23. To the physician Pæon. [ance.
Pæpalanthus, 355. *Gr.*, dust-flower; its appear-
Palafoxia, 181. To Palafox, a Spanish general.
PALMACEÆ, 316.
Panax, 142. *Gr.*, all-healing; sc. the Ginseng.
Pancratium, 333. *Gr.*, all-potent.
Panicum, 358. *Lat.*, a panicle.
Papaver, 32. *Lat.*, pap, or thick milk; Poppy
PAPAVERACEÆ, 31. [seeds were used in pap
PAPILIONACEÆ, 80. [for children.
Pardanthus, 337. *Gr.*, leopard flower. [cality.
Parietaria, 301. *Gr.*, a wall; their frequent lo-
Parnassia, 115. Mt. Parnassus was feigned their nativity. [dy for felon.
Paronychia, 57 (58). *Gr.*, near the nail; reme-
Parthenium, 173. *Gr.*, a virgin; sc. its medicinal properties. [Millet.
Paspalum, 358. One of the Greek names for
Passiflora, 129. *Lat.*, passion-flower; the floral organs resembling the *Cross and nails.*
PASSIFLORACEÆ, 129. [its form.
Pastinaca, 136. *Lat.*, a garden dibble; from
Paulownia, 225. To Paulownia, princess of Rus-
Pavia, 75. To Prof. Peter Paiv, Leyden. [sia.
Pedicularis, 232. *Lat.*, a louse; sc. Lousewort.
Pelargonium, 68. *Gr.*, a stork; sc. Stork-bill.
Pellæa, 369. *Gr.*, little cup. [character.
Peltandra, 318. *Gr.*, shield anther; from the
Penicillaria, 358. *Lat.*, a pencil; sc. the spikes.
Penthorum, 119. *Gr.*, five bounds; sc. 5 styles.
Pentstemon, 224. *Gr.*, five stamens.
Perilla, 240. A word unexplained.
Periploca, 274. *Gr.*, intertwining.
Persea, 290. Adopted from the Egyptian.
Persicaria, 282. *Lat.*, Peach-like.
PETALIFERÆ, 316. [mens.
Petalostemon, 93. *Gr.*, petals (joined to) sta-
Petiveria, 284. To Dr. J. Petiver, F. R. S.
Petunia, 264. Adopted from the Brazil'n *petun*.
Peucedanum, 136. *Gr.*, parched pine; sc. its
Phaca, 94. *Gr.*, to eat; food. [resinous smell.
Phacelia, 225. *Gr.*, a bundle; sc. the flowers.
PHÆNOGAMIA, 15.
Phalaris, 358. *Gr.*, brilliant; its shining seeds.
Pharbitis, 259. Meaning not known.
Phaseolus, 96. *Lat.*, a little boat; sc. the pods.

Phelipæa, 217. To L. & J. Phelipaux, French.
Philadelphus, 116. Adopted from Aristotle.
Phlegopteris, 368. *Gr.*, burning wing or fern.
Phleum, 358. Adopted from the Greek.
Phlomis, 248. *Gr.*, flame; used for lamp-wicks.
Phlox, 256. *Gr.*, flame: the appearance of the fls.
Phoradendron, 291. *Gr.*, thief of the tree; tree
Phragmites, 358. *Gr.*, a hedge; its use. [thief.
Phryma, 236. The meaning unknown.
Phygelius, 225. [on the leaf-like stems.
Phyllanthus, 297. *Gr.*, leaf-flower; the flowers
Phyllocactus, 133. *Gr.*, leaf Cactus. [leaves.
Phyllodendron, 319. *Gr.*, leaf-tree; immense
Phyllodoce, 201. A mythological name.
Physalis, 263. *Gr.*, a bladder; sc. the calyx.
Physostegia, 247. *Gr.*, bladder covering; calyx.
Phytolacca, 284. *Gr.*, plant lac; the crimson
PHYTOLACCACEÆ, 284. [fruit.
Pilea, 300. *Lat.*, a cap; one of the sepals.
Pimpinella, 139. Altered from *bipinnate*.
Pinckneya, 150. To Gen. Pinckney, of S. Car.
Pinguicula, 215. *Lat.*, fat; the greasy leaves.
Pinus, 312. The ancient Greek name.
Piriqueta, 129. Meaning unknown.
Pisonia, 279. To M. Piso, M. D., Amsterdam.
Pistia, 310. Meaning unexplained.
Pisum, 85. Celt., *pis*,=a pea.
PITTOSPORACEÆ, 9.
Planera, 299. To J. Planer, a German botanist.
PLANTAGINACEÆ, 213. [in footpaths.
Plantago, 213. *Lat.*, the sole of the foot; grows
PLATANACEÆ, 303.
Platanthera, 306. *Gr.*, broad anther.
Platanus, 303. *Gr.*, ample; the branches & lvs.
Platycerium, 367. *Gr.*, broad horn; the split
Platycodon, 187. *Gr.*, broad bell. [frond.
Pleea, 349. *Gr.*, the Pleiades; seven white fls.
Pluchea, 171. Meaning unexplained.
PLUMBAGINACEÆ, 214. [der of the eyes.
Plumbago, 215. A cure for *plumbago*, a disor-
Poa, 358. The general Greek word for grass.
Podocarpus, 316. *Gr.*, fruit-stalks (long).
Podophyllum, 28. *Gr.*, foot leaf; duck's-foot.
PODOSTEMIACEÆ, 302.
Podostemum, 302. *Gr.*, foot stem?
Podostigma, 373. *Gr.*, foot (stalked) stigma.
Pogonia, 330. *Gr.*, beard; flowers fringed.
Poinciana, 99. To M. de Poinci, gov. Antilles.
Polanisia, 41. *Gr.*, many unequal (stamens).
POLEMONIACEÆ, 256.
Polemonium, 257. *Gr.*, war; Pliny says that two kings fought for its honors.
Polianthes, 334. *Gr.*, polished flower.
Polyanthes, 334. *Gr.*, many flowers.
Polycarpon, 57. *Gr.*, much fruit.
Polygala, 78. *Gr.*, much milk; effect on goats.
POLYGALACEÆ, 78.
POLYGONACEÆ, 280.
Polygonatum, 346. *Gr.*, many joints.
Polygonella, 282. From Polygonum.
Polygonum, 282. *Gr.*, many joints.
Polymnia, 172. The name of one of the Muses.
Polypodium, 368. *Gr.*, many feet (roots).
Polypogon, 357. *Gr.*, much beard.
Polypremum, 269. *Gr.*, many stems.
Polypteris, 181. *Gr.*, many wings.
Polytænia, 136. *Gr.*, many fillets (vittæ).
Pontederia, 350. To Prof. Julius Pontedera,
PONTEDERIACEÆ, 350. [of Padua.
Ponthieva, 330. To M. de Ponthieu, W. India.
Populus, 311. The *arbor populi* of the Romans.
Portulaca, 59. *Lat.*, to carry milk, or juice.
PORTULACACEÆ, 58.
Potamogeton, 321. *Gr.*, neighbor of the river.
Potentilla, 107. *Lat.*, powerful (in medicine).
Poterium, 108. *Lat.*, a cup; used in cool drinks.
Primula, 211. *Lat.*, the first; early flowering.
PRIMULACEÆ, 210.
Prinos, 208. The Greek name of the Holly.
Priva, 235. Derivation unknown. [dulous.
Prosartes, 347. *Gr.*, to suspend; sc. fls. pen-
Proserpinaca, 120. *Lat.*, to creep; sc. the roots.
Prunus, 101. The old Greek name.
Psilocarya, 356. *Gr.*, slender Carex.
Psilotum, 363. *Gr.*, naked (of leaves).
Psoralea, 92. *Gr.*, scurfy; from the appear-
Psycotria, 147. Gr., *psyche*, life? [ance.
Ptelea, 71. The Greek name for the Elm.
Pteris, 369. *Gr.*, a wing; the fronds.
Pterocaulon, 171. *Gr.*, winged stem.
Pterospora, 207. *Gr.*, winged seed.
Pulsatilla, 17. A coined name.
Punica, 123. *Lat.*, of or near Carthage.
Pycnanthemum, 241. *Gr.*, dense flowers.
Pyrethrum, 84. *Gr.*, fire; taste of the roots.
Pyrola, 225. From *Pyrus*, pear-tree; its lvs.
Pyrrhopappus, 193. *Gr.*, flame-colored pappus.
Pyrularia, 292. Meaning unexplained.
Pyrus, 112. *Peren* was the Celtic word for Pear.
Pyxidanthera, 258. *Gr.*, box anther. [*cyamos*.
Quamoclit, 258. Resembles the bean-vine,=
Quercus, 305. The orig. name, from the Celtic.
Randia, 147. To J. Rand, a London botanist.
RANUNCULACEÆ, 15. [phibious.
Ranunculus, 19. *Lat.*, a little frog; sc. am-
Raphanus, 43. *Gr.*, quick to appear; rapid
Reseda, 45. *Lat.*, to calm, or soothe. [growth.
RESEDACEÆ, 44.
RHAMNACEÆ, 76.
Rhamnus, 77. The old name, from the Celtic.
Rheum, 281. First found on the banks of the River Rha (Volga).
Rhexia, 122. *Lat.*, a rupture; an astringent.
Rhinanthus, 232. *Gr.*, snout-flower.
RHIZOPORACEÆ, 8.
Rhodanthe, 186. *Gr.*, rose-flower.
Rhododendron, 203. *Gr.*, rose-tree.
Rhodora, 204. *Gr.*, the rose; sc. the color.
Rhus, 72. From the Celtic *rhudd*, red.
Rhynchosia, 96. *Gr.*, a beak; flower beaked.
Rhynchospora, 356. *Gr.*, beak-seed.
Rhytiglossa, 234. *Gr.*, wrinkled tongue.
Ribes, 117. Adopted from the Arabic.
Richardia, 319. To L. C. Richard, French.
Ricinus, 297. *Lat.*, a tick; sc. the seeds.
Rivina, 284. To A. Q. Rivinus, of Saxony.
Robinia, 95. To Jean Robin, bot. to Henry IV.
Rochea, 119. To M. de la Roche, French.
Rosa, 108. *Celt.*, red; the prevailing color of
ROSACEÆ, 101. [the flowers.
Rosmarinus, 244. *Lat.*, dew of the sea.
Rottbœllia, 359. To C. F. Rottbœll, Danish.
Roubieva, 285. To G. J. Roubieu, French.
ROXBURGHIACEÆ, 339.
Rubia, 148. *Lat.*, red; the color of the roots.
RUBIACEÆ, 147.
Rubus, 104. *Celt.*, red; color of the fruit.
Rudbeckia, 175. To Prof. Olaf Rudbec, Upsal.
Ruellia, 233. To John Ruelle, bot. to Francis I.
Rugelia, 188. To Mr. Rugel, collector in Fla.
Rumex, 281. *Lat.*, to suck; the lvs. allay thirst.
Ruppia, 321. To H. B. Ruppia, German.
Russelia, 225. To Alex. Russel, M.D., F. R. S.
Ruta, 70. *Gr.*, to flow; Eng., *Rue*.
RUTACEÆ, 70.
Sabal, 317. Word not explained.

Sabbatia, 266. To L. Sabbati, an Italian bot.
Saccharum, 359. The Arabic name is *soukar;*
Sageretia, 75. To M. Sageret, Fr. [Eng., *sugar.*
Sagina, 56 (55). *Lat.*, fatness; for pasturage.
Sagittaria, 323. *Lat.*, an arrow; shape of the
SALICACEÆ, 309. [leaves.
Salicornia, 287. *Lat.*, salt horn; the locality
and shape. [Salisbury, Eng.
Salisburia, 316. To the distinguished R. A.
Salix, 309. *Celtic*, near the water. [style.
Salpiglossis, 211. *Gr.*, tube tongue; sc. the
Salsola, 288. *Lat.*, salt; grows in salt marshes.
Salvia, 244. Lat., *salvo*, to save; salutary.
Sambucus, 146. *Lat.*, a musical instrument,
made of elderwood.
Samolus, 213. *Celtic*, pig's food. [juice.
Sanguinaria, 31. *Lat.*, blood; filled with red
Sanguisorba, 108. *Lat.*, to absorb (stanch)
Sanicula, 135. *Lat.*, to heal. [blood.
SANTALACEÆ, 291.
SAPINDACEÆ, 73.
Sapindus, 75. Sapo Indicus; Indian soap.
Saponaria, 53. *Lat.*, soap; sc. Soapwort.
SAPOTACEÆ, 210. [corona.
Sarcostemma, 272. *Gr.*, fleshy crown; the
Sarracenia, 30. To Dr. Sarrasin, of Quebec.
SARRACENIACEÆ, 30.
Sassafras, 290. The aboriginal name.
Satureja, 242. The Arabic *Sattar*, a labiate
SAURURACEÆ, 301. [plant.
Saururus, 301. *Gr.*, lizard-tail.
Saxifraga, 113. *Lat.*, to break a stone: growing in the clefts of rocks.
SAXIFRAGACEÆ, 112.
Scabiosa, 152. *Lat.*, the itch; which it cures.
Scævola, 10. *Lat.*, the left hand; sc. the corolla.
Scandix, 137. The Greek name of an eatable
plant. [a German botanist.
Schæfferia, 76. To Jos. Christian Schæffer,
Scheuchzeria, 324. To John and Jas. Scheuchzer, German. [flowers.
Schizæa, 267. *Lat.*, to cut; applied to the
Schizandra, 25. *Lat.*, to cleave (the stamens).
Schizanthus, 221. *Lat.*, cut flower.
Schizopetalon, 40. *Lat.*, cut petals.
Schizostylis, 337. *Lat.*, cut style.
Schœnocaulon, 348. *Gr.*, rush-stem.
Schœnolirion, 344. *Gr.*, Rush-lily.
Schollera, 350. To one Scholler, a Germ. bot.
Schrankia, 82. To F. de Paula Schrank, Germ.
Schwalbea, 232. To one Schwalb, Germ. bot.
Schweinitzia, 207. To Rev. Lewis de Schweinitz, North Carolina.
Scilla, 343, *Gr.*, to injure: bulb poisonous.
Scirpus, 356. Celt., *cirs*, rushes.
SCITAMINEÆ, 331.
Scleranthus, 58. *Gr.*, hard flower.
Scleria, 356. *Gr.*, hard; referring to the fruit.
Sclerolepis, 156. *Gr.*, hard scales.
Scolopendrium, 373. *Lat.*, a centipede; its
appearance beneath.
Scrophularia, 224. Good in the scrofula.
SCROPHULARIACEÆ, 220. [sc. the calyx.
Scutellaria, 246. *Lat.*, a little cup, or vizor;
Scutia, 76. *Lat.*, a shield. [tian.
Sebastiana, 293 (296). Dedicated to St. Sebas-
Secale, 359. The ancient name of Rye.
Sedum, 118. *Lat.*, to sit; habit of the plants.
Selaginella, 362. Diminutive, from Selago,
club-moss. [ley.
Selinum, 139. *Selinon* is the Greek for Pars-
Sempervivum, 119. *Lat*,, to live forever.
Senebiera, 43. To John de Senebier, Geneva.
Senecio, 187. *Lat.*, an old man; the receptacle
Sequoya, 315. The Indian name. [naked.
Sericocarpus, 160. *Lat.*, silken fruit.
Sesamum, 219. From the Egyptian, *Sempsen.*
Sesbania, 93. The Arabic name is *Sesban.*
Sesuvium, 133. Not explained.
Setaria, 358. *Lat.*, a bristle; sc. the involucre.
Seutera, 274. Not explained.
Seymeria, 230. To Henry Seymer, English.
Shepherdia, 293. To John Shepherd, Liver-
Shortia, 206. To Dr. Short, Kentucky. [pool.
Sibbaldia, 107. To Prof. Robert Sibbald, Edin-
Sicyos, 130. The Greek for Cucumber. [burgh.
Sida, 61. Adopted from Theophrastus.
Sideroxylon, 210. *Gr.*, iron-wood. [tions.
Silene, 53. *Gr.*, saliva; from the viscid secre-
Silphium, 172. Adopted from the Greek.
Simaruba, 72. The name in the West Indies.
SIMARUBACEÆ, 71. [bage-plants.
Sinapis, 40. A general name in Greek for cab-
Siphonychia, 58. *Gr.*, tube, and Anychia.
Sisymbrium, 39 (37). The old Greek name.
Sisyrinchium, 337. *Gr.*, pig-snout; sc. the
spathe.
Sium, 141 (140). From a Celtic word for water.
SMILACEÆ, 338.
Smilacina, 346. Derived from Smilax.
Smilax, 338. *Gr.*, a scraper; from its rough-
SOLANACEÆ, 261. [ness.
Solanum, 262. Etymology doubtful.
Solea, 45. To W. Sole, of England.
Solidago, 166. *Lat.*, to unite; good for wounds.
Soliva, 185. To Salvator Soliva, M. D., Spain.
Sonchus, 194. *Gr.*, hollow; its stems are hol-
Sophora, 100. Adopted from the Arabic. [low.
Sorbus, 112. Old name for Mountain Ash.
Sorghum, 359. The Italian name is Sorghi.
SPADICIFLORÆ, 316. [like leaves.
Sparganium, 320. *Gr.*, a fillet; for the ribbon-
Spartina, 359. *Gr.*, a rope; the use of its lvs.
Spartium, 90. *Gr.*, a rope; use of its twigs.
Specularia, 196. *Lat.*, a mirror; suggested by
the flowers.
Spergula, 57. *Lat.*, to scatter (its seeds).
Spurgularia, 57. From Spergula.
Spermococe, 149. *Gr.*, seed-points; the pod
pointed with the calyx lobes.
Sphenogyne, 173. *Gr.*, wedge-shaped pistil.
Spigelia, 269. To Prof. Adrien Spigelius, Padua, 1620. [brown.
Spilanthes, 180. *Gr.*, spot-flower; the disk
Spinacia, 287. *Lat.*, a spine or prickle.
Spiræa, 103. *Gr.*, to wind; sc. into wreaths.
Spiranthes, 329. *Gr.*, spiral fls.; spike twisted.
Spirodela, 319. *Gr.*, spiral bait; duck-meat.
Sporobolus, 357. *Gr.*, to cast the seeds; drop-
Sprekelia, 334. A personal name. [seed.
Stachys, 248. A spike (of flowers).
Stachytarpha, 235. *Gr.*, spikes dense. [dam.
Stapelia, 275. To Dr. Boderus Stapel, Amster-
Staphylea, 74. *Gr.*, a cluster (the scarlet fr.)
Statice, 215. *Gr.*, to stop; an astringent.
Stellaria, 55. *Lat.*, a star.
Stenanthium, 347. *Gr.*, narrow flower.
Stenotaphrum, 359.
Stephanotis, 275. *Gr.*, crown, ear; crown
with ear-shaped segments.
Sterculia, 63. Lat., *stercus;* from its bad odor.
STERCULIACEÆ, 63.
Stillingia, 296. To Dr. Benj. Stillingfleet, Eng.
Stipa, 358. *Lat.*, something silky or feathery.
Stipulicida, 57. *Lat.*, cut stipules.
Stokesia, 156. To Dr. Jonathan Stokes, Eng.

Strelitzia, 331. To the Queen of George III., of Mecklenburg-Strelitz.
Streptopus, 347. *Gr.*, twisted foot (-stalk).
Strumpfia, 147. A personal name.
Struthiopteris, 369. *Gr.*, ostrich-wing (fern).
Stuartia, 65. To John Stuart, Marquis of Bute.
Stylisma, 260. Refers to the two styles.
Stylosanthus, 87. *Gr.*, style, flower; style long.
STYRACACEÆ, 208.
Styrax, 209. The Arabic name is Assthiac.
Subularia, 42. *Subula* is the Latin for an awl.
Sullivantia, 114. To Wm. S. Sullivant, Ohio.
Swietenia, 66. To Gerard van Swieten, Holland.
SURIANACEÆ, 8.
Symphoricarpus, 144. *Gr.*, to accumulate fruit.
Symphytum, 252. *Gr.*, to cause to unite; healing.
Symplocarpus, 318. *Gr.*, connected fruit.
Symplocos, 208. *Gr.*, connected (stamens).
Synandra, 247. *Gr.*, united anthers.
Syndesmon, 17. *Gr.*, with a bond.
Synthyris, 228. *Gr.*, door (valves) closed.
Syringa, 276. *Gr.*, a pipe; the slender shoots are filled only with pith.
Tagetes, 188. Dedicated to Tages, a Tuscan god.
Talinum, 59. From *thalia*, a green branch?
Tamarix, 64. Found on the river Tamaris, France.
TAMARISCINEÆ, 63.
Tanacetum, 183. Altered from Athanasia?
Taraxacum, 193. *Gr.*, a cathartic.
TAXACEÆ, 315.
Taxodium, 315. *Gr.*, like the Yew.
Taxus, 315. *Gr.*, the bow; used for making.
Tecoma, 218. The Mexican name.
Telanthera, 289. *Gr.*, complete or perfect flowers.
Tephrosia, 94. *Gr.*, ash-colored (herbage).
Tetragonotheca, 175. *Gr.*, four-angled envelope.
Tetranthera, 291. *Gr.*, four anthers.
Teucrium, 239. To Teucer, founder of Troy.
Thalia, 332. To J. Thalius, M. D., Germ., 1585.
Thalictrum, 18. *Gr.*, to grow green.
Thaspium, 138. From the Isle of Thaspia or Thapsus.
Thea, 65. *Teha* is the Chinese for Tea.
THEOPHRASTACEÆ, 210.
Thermopsis, 85. *Gr.*, like a Lupine.
Thunbergia, 233. To Charles P. Thunberg, F. R. S.
Thuya, 315. Gr. *thyou*, a sacrifice; the wood so used.
Thuyopsis, 315. Like Thuya.
THYMELACEÆ, 292.
Thymus, 243. *Gr.*, courage; the smell of Thyme is reviving.
Thysanella, 282. Gr. *thysanotus*, fringed.
Tiarella, 113. *Tiara*, a Persian diadem.
Tiedmannia, 136. To Prof. Tiedmann, Heidelburg.
Tigridia, 337. *Lat.*, like a tiger; fls. spotted.
Tilia, 64. Etymology unknown.
TILIACEÆ, 64.
Tillæa, 118. To M. A. Tilli, Italian.
Tillandsia, 335. To Prof. Elias Tillands, Abo.
Tipularia, 328. Lat., *Tipula*, the crane-fly.
Tofieldia, 349. Dedicated to a Mr. Tofield.
Torreya, 316. Dedicated to Dr. John Torrey.
Tournefortia, 250. To Joseph P. de Tournefort.
Tradescantia, 353. To J. Tradescant, gardener.
Tragia, 296. To Jerome Bock Tragus, German.
Tragopogon, 191. *Gr.*, goat's beard; the pappus.
Trautvetteria, 19. To one Trautvetter, Germ.
Tribulus, 67. *Gr.*, 3-pointed; sc. each carpel.
Trichelostylis, 356. *Gr.*, triple style.
Trichomanes, 367. *Gr.*, soft hair; the stipes.
Trichostema, 239. *Gr.*, hair stamens.
Tricuspis, 358. *Gr.*, 3-cusped; the chaff.
Trientalis, 212. Lat., *triens*, 3 inches (high).
Trifolium, 91. *Lat.*, three-leaf; lvs. 3-foliate.
Triglochin, 324. *Gr.*, three points; pod 3-angl.
Trigonella, 100. *Gr.*, 3-angled; so the corolla.
TRILLIACEÆ, 340.
Trillium, 340. Parts of the plant all in 3s.
Triosteum, 144. *Gr.*, three bones (bony seeds).
Tripsacum, 359. *Gr.*, to thresh.
Trisetum, 358. *Lat.*, three bristles (awns).
Triticum, 359. Lat. *trito*, to rub or grind.
Tritoma, 345. *Gr.*, thrice-cutting; lvs. 3-edged.
Trollius, 21. German, *trol*, something round.
Tropæolum, 69. *Gr.*, trophy; shield and helmet.
Troximon, 193. *Gr.*, something eatable.
TUBULIFLORÆ, 152, 153.
Tulipa, 141. The Persian name is *Thoulyban*.
Turnera, 129. To Wm. Turner, M. D., London, 1550.
TURNERACEÆ, 128.
Turritis, 36. *Lat.*, a tower; remarkably erect.
Tussilago, 160. Lat., *tussis*, a cough; cure for.
Typha, 320. *Gr.*, a marsh; the habitat.
TYPHACEÆ, 319.
ULMACEÆ, 298.
Ulmus, 298. The Saxon name was *ulm*.
UMBELLIFERÆ, 133.
Uniola, 358. *Lat.*, unity; many fls. in one?
Urtica, 300. *Lat.*, to burn (*uro*); stinging.
URTICACEÆ, 298.
Utricularia, 216. Lat., *utriculu*, a little bladder.
Uvularia, 347. Used for diseases of the *uvula*.
Vaccinium, 198. The ancient name.
Vachellia, 99. Not explained.
Valeriana, 150. To King Valerius.
VALERIANACEÆ, 150.
Valerianella, 151. Derived from Valeriana.
Vallesia, 270. To F. Vallesio, phys. to Philip II.
Vallisneria, 325. To Ant. Vallisner, Italy.
Vallota, 333. To Pierre Vallo, French.
Veratrum, 348. *Lat.*, true black; the fls. or root.
Verbascum, 222. *Lat.*, beard; plant woolly.
Verbena, 235. From the Celtic *Ferfæn*.
VERBENACEÆ, 235.
Verbesina, 180. Same meaning as Verbena.
Vernonia, 155. To Wm. Vernon, collector in North America.
Veronica, 229. Not well explained.
Vesicaria, 42. *Lat.*, a blister; the inflated pods.
Viburnum, 146. *Lat.*, to tie; twigs pliant.
Vicia, 86. Lat., *vincio*, to bind; its tendrils.
Victoria, 30. To Queen Victoria, of England.
Vigna, 96. To Dominic Vigni.
Vilfa, 357. Of unknown meaning.
Vinca, 270. Lat. *vinculum*, a band.
Vincetoxicum, 274. Meaning unexplained.
Viola, 45. The old Latin name.
VIOLACEÆ, 45.
Visiana, 276. To Prof. Visiani, Patavia.
VITACEÆ, 77.
Vitex, 237. Lat., *vieo*, to bind; branches flexible.
Vitis, 77. Celtic, *gwyd*, = best of trees.
Vittaria, 365. Lat., *vitta*, a riband; its form.
Waldsteinia, 107. To Franz de Waldstein.
Waltheria, 63. To Prof. A. F. Walther, Leipsic.
Warea, 39. To Mr. Ware, its discoverer.
Whitlavia, 255. A personal name.
Wiegela, 292. A personal name.
Wigandia, 256. To Bishop Wigand, of Pomerania.
Wistaria, 93. To Prof. Caspar Wistar, Phila.
Wolffia, 319. A personal name.
Woodsia, 373. To Joseph Woods, English.
Woodwardia, 371. To Thomas J. Woodward,
Xanthium, 174. Said to dye the hair *yellow*.
Xanthosoma, 318. *Gr.*, yellow mouth.
Xanthoxylum. See Zanthoxylum.
Xeranthemum, 186. *Gr.*, dry flowers.

Xerophyllum, 349. *Gr.*, dry leaf.
Ximenia. 10. To F. Ximenes, a Spanish monk.
Xylosteon. 145. *Gr.*, wood bone; hard wood.
XYRIDACEÆ, 354.
Xyris, 354. *Gr.*, acute; sc. the leaves.
Yucca, 345. The Peruvian name.
Zannichellia, 321. To John J. Zannichelli, Italy.
Zanthorhiza, 21. *Gr.*, yellow root.
Zanthoxylum, 70. *Gr.*, yellow wood.
Zauschneria, 125. A personal name.
Zea, 359. Gr., *zao*, to live; plants nutritive.
Zephyranthus, 333. *Gr.*, zephyr flower.
Zigadenus, 348. *Gr.*, joined glands (on the petals).
Zinnia, 175. To Prof. John G. Zinn, Gottingen.
Zizania, 357. A Greek name adopted.
Zizia, 138 (139). To J. B. Zizi, German.
Zornia, 86. To John Zorn, Bavaria.
Zostera, 321. *Gr.*, a riband; sc. the long lvs.
ZYGOPHYLLACEÆ, 66.

ENGLISH INDEX.

Abele Poplar 311
Acacia, Rose 95
ACANTHADS 233
Aconite 23
ACROGENS 360
Adam and Eve 328
Adder's-tongue 366
Agrimony 108
Alder (208) 308
Alexanders 138
All-seed 57
Almond 103
Aloe 333
Alum-root 115
AMARANTHS 288
Amaranth, Globe 289
AMARYLLIDS 332
American Centaury 266
American Laurel 200
Angelica 137
Angelica-tree 142
Angelico 140
Anise (24) 139
ANONADS 26
Apple 112
Apple Haw 111
Apple of Peru 263
Apple of Sodom 263
Apricot 103
ARALIADS 142
Arbor-vitæ 315
AROIDS 317
Arrow Grass 324
Arrow-head 323
Arrow-root 312
Arrow-wood 146
Artichoke (177) 188
ASCLEPIADS 271
Ash (70, 112) 277
Ash Maple 74
Aspen 311
Aster 160
ASTERWORTS 152
Atamasco Lily 333
Auricula 211
Avens 105
Awlwort 42
Bachelor's Button 188
Balm (72, 241, 311) 243
Balm-of-Gilead 72, 311
Balsamine 70
Baltimore Belle 109
Banana 331
Baneberry 33
Banyan 299
Barley 358
Basil (238, 243) 241
Bass-wood 64
Bastard Toad-Flax 291
Bath-flower 340
Bay 24, 65, 124, 203, 290
Bayberry 309
Bay-galls 290
Bayonet Rush 353
Bean (268) 96
BEAN CAPERS 66
Bear-berry 201
Beard Grass 359
Beard-tongue 224
Bear's Grass 345
Bear's Thread 345
Bed-straw 148
Beech 307
Beechdrops (207) 217
Beet 285
Beetleweed 206
Beggar-ticks 180, 251
BEGONIADS 131
BELLWORTS 196
Bellwort 347
Bent Grass 357
BERBERIDS 27
Berberry 27
Bergamot 245
Betony 249
Bhotan Pine 312
Big Laurel 24
Bilberry 198
Bindweed (283) 260
BINDWEEDS 258
Birch 308
BIRCHWORTS 307
Bird's-nest 206, 372
Birthwort 278
BIRTHWORTS 278
Bishop's-cap 113
Bishopweed 141
Bitter Cress 37
Bitter-nut 304
Bittersweet 262
Bitter Vetch 100
Black Alder 208
Blackberry 104
Blackberry Lily 337
Black Grass 352
Black Haw 147
Black Hoarhound 248
Black Jack 305
Blackroot 171
Black Snakeroot 23
Black Thorn 111
Bladder Campion 53
Bladder Fern 373
Bladder-nut 74
Bladder-pod 42
Bladder Senna 95
Bladderwort 216
Blazing Star 157, 349
Bleeding-heart 33
Blessed Thistle 189
Blite 286
Blood-root 31
BLOODWORTS 335
Bluebell 196
Blueberry 198
Blue-curls 239
Blue Dangles 198
Blue-eyed Grass 337
Blue Flag 336
Blue Grass 359
Blue-hearts 230
Blue Palmetto 317
Bluets 149
Bog Rush 356
Boneset (160) 158
Borrage 251
BORRAGEWORTS 250
Boston Iris 336
Bottle-brush 122
Bouncing Bet 53
Boursault 109
Bowman's-root 104
Box Elder 74
Boxwood 298
Brake 369
Bramble 104
Bridal Rose 105
Brier (82) 109
Broccoli 40
Brome Grass 358
BROMELIADS 335
Brooklime 229
Broom 90, 100
Broom Corn 359
Broom Grass 359
Broom-rape 217

BROOMRAPES 217
Bryony 130
Buck Bean 268
Buck-eye 74
Buckthorn 77
BUCKTHORNS 76
Buckwheat 284
Buckwheat-tree 205
Buffalo-berry 293
Bugbane 23
Bugleweed 240
Bugloss (251) 252
Bull Rush 356
Burdock (173) 190
Burnet 108
Burning-bush 76
Burr Grass 358
Burr Marigold 180
Burr Reed 320
Burr-seed 251
BURSERIDS 72
Bush Clover 89
Bush Honeysuckle 146
Bush Trefoil 88
Buttercups 19
Butterfly-weed 273
Butternut 304
Butterweed 187
BUTTERWORTS 215
Button-bush 150
Buttonwood 303
Cabbage 40
Cactus 132
Cajeput 124
Cale 40
Calaminth 243
Calamus 319
Calico-bush 200
California Poppy 32
CALYCANTHS 25
CAMELLIAS 64
Campion 53, 54
Canada Thistle 189
Canary-bird 69
Canary Grass 358
Candleberry 309
Candytuft 42
Cane 359
Canterbury Bells 196
CAPERS 66
Caper Spurge 295
CAPPARIDS 44
Caraway 138
Cardinal-flower 195
Cardoon 188
Carnation 52
Carolina Beech-drops 207
Carpet Cress 43
Carpet-weed 58
Carrion-flower 275, 339
Carrot 139
Cassena Tea 208
Castor-oil Plant 297
Catalpa 218
Catchfly 53
Catchfly Grass 358
Cat-gut 94
Catmint 245
Catnep 246
Cat-tail 320
Cauliflower 40
Cayenne Pepper 263
Cedar 314, 315
Cedar-of-Lebanon 314
Celandine 31
Celery 140
Centaury 266
Century Plant 334
Chaff-seed 232
Chamomile 183
Chaste-tree 237
Cheat 358
Checkerberry 201
CHENOPODS 284
Cherry (262, 263) 102
Cherry Laurel 102
Chequered Lily 342
Chervil 137
Chess 358
Chestnut 206
Chick Pea 85
Chickweed 54, 55
Chickweed Wintergreen 212
Chicory 190
China Aster 165
Chinquapin 307
Chokeberry 112
Chokecherry 102
Christmas Rose 21
Cinnamon Fern 366
Cinquefoil 107
Citron-tree 130
Cives 344
Cleavers 148
Climbing Boneset 160
Climbing Fern 366
Clotweed 174
Cloudberry 105
Clover (89, 92) 91
Club Moss (362) 361
CLUB MOSSES 361
Club Rush 356
Cock's-comb 288
Cockspur Grass 358
Cocoa Plum 101
Coffee Bean 85
Coffee-tree 83
Cohosh 27
Colic-root 335
Colocynth 131
Colt's-foot 160
Columbine 22
Columbo 268
Comfrey 252
Cone-flower 175
CONIFERS 312
Coontie 312
Coral-root 328
Coriander 141
Corn Cockle 54
Cornel 143
CORNELS 142
Corn Flag 338
Cotton 63
Cotton Grass 356
Cotton Rose 185
Cotton Thistle 189
Cottonwood 311
Couch Grass 358
Cowbane 136
Cowslip (211) 21
Cow-wheat 233
Crab Grass 358
Crab Tree 112
Cranberry (146) 199
Crane's-bill 68
Crape Myrtle 173
Creeping Greenhead 150
Cress 36, 37, 39, 43, 69
Crest-flower 335
Crookneck Squash 130
CROWBERRIES 302
Crowberry 303
Crowfoot 19
CROWFOOTS 15
Crow Garlic 344
Crownbeard 180
Crown Imperial 343
CRUCIFERS 34
Cuckoo-flower 38
Cucumber (130) 131
Cucumber-root 340
Cucumber-tree 29
CUCURBITS 129
Cudweed 185
Culver's Physic 229
Cup-plant 173
Cupseed 27
Currants 117
Cutflower 221
Cut Grass 357
CYCADS 311
Cypress (257) 315
Cypress Vine 258
Daffodil 333
Dahlia 166
Dahoon 207
Daisy 165
Dandelion (191) 193
DAPHNADS 292
Darnel 359
Daughter-of-Spring 140
Day Lily 345
Deadly Nightshade 264
Deerberry 198
Deer-grass 122
Deer's-tongue 157
Dewberry 105
Dickson's Fern 371
Dill 136
Ditch Grass 321
Ditch Moss 324
Dittany 240
Dock 281
Dockmackie 146
Dodder 260
Dogbane 270
DOGBANES 269
Dog Fennel 181, 183
Dogwood 73, 143
Doorweed 282
Dragonhead 246
Dragon-root 318
Drop-flower 192
Dropseed 357
Dry Strawberry 107
Duckmeat 319
Dundee Rambler 109
Dutchman's Pipe 278
Dwarf Clubmoss 362
Dwarf Dandelion 191
Dwarf Pink 149
Dyer's Broom 90
Dyer's Cleavers 148
Dyer's-weed 45
Ear-drop 33, 127
Earth-galls 192
EBONADS 209
Eel-grass 325

Egg-plant ... 263
Eglantine ... 109
Egyptian Calla ... 319
Elder ... (74, 142, 174) 146
Elecampane ... 171
Elephant's-ear ... 131
Elephant's-foot ... 156
Elm ... 298
Enchanter's Nightshade ... 128
Endive ... 191
ENDOGENS ... 316
English Mint ... 183
English Moss ... 118
Eternal Flower ... 186
Evening Primrose ... 125
Everlasting ... 185
Everlasting Pea ... 86
EXOGENS ... 15
Eyebright ... 232
False Dogfennel ... 181
False Flax ... 42
False Goldenrod ... 166
False Hellebore ... 348
False Mermaid ... 68
False Nettle ... 300
False Pennyroyal ... 239
False Pimpernel ... 213
False Redtop ... 358
False Rice ... 357
False Rocket ... 36
False Rue-Anemone ... 20
False Syringa ... 116
False Violet ... 105
False Wallflower ... 39
Felwort ... 268
Fennel ... 139
Fennel-flower ... 21
Fenugreek ... 100
FERNS ... 264
Fescue Grass ... 358
Festoon Pine ... 362
Fetter-bush ... 202
Feverfew ... 183
Feverwort ... 144
Fig ... 299
Figwort ... 224
FIGWORTS ... 220
Filbert ... 307
Finger Grass ... 359
Fireweed ... 186
Fir ... 313
Fir Balsam ... 314
Flag ... 318, 336
Flaming Pinxter ... 203
FLAXWORTS, Flax ... 66
Fleabane ... 427
Fleur-de-lis ... 337
Flixweed ... 39
Floating-heart ... 268
Florida Arrowroot ... 312
Florin Grass ... 358
Flower-de-luce ... 336
Flowering Fern ... 366
FLOWERING PLANTS ... 15
FLOWERLESS PLANTS 360
Flower-of-an-hour ... 63
Fly-poison ... 348
Fogfruit ... 336
Fool's Parsley ... 140
Forget-me-not ... 252
Forked Spike ... 359
Foul-meadow ... 358
Four-o'clock ... 279
Foxglove ... (230) 228
Foxtail ... 358
Fraxinella ... 70
French Mulberry ... 236
Fringe Grass ... 358
Fringe-tree ... 276
FROGBITS ... 324
Frost-plant ... 47
FUMEWORTS ... 33
Fumitory ... 34
GALEWORTS ... 308
Gale ... 309
Galingale ... 356
Gargetweed ... 284
Garden Orache ... 287
Garlic ... 344
Gray-feather ... 157
Gentian ... 267
GENTIANWORTS ... 266
GERANIA ... 67
Geranium ... 68
Germander ... 239
GESNERWORTS ... 219
Gilia ... 257
Gill-over-the-ground ... 246
Ginger, Wild ... 278
GINGERWORTS ... 331
Ginseng ... 142
Glasswort ... 287
Globe Amaranth ... 289
Globe-flower ... 21
Glue Mallow ... 62
Gnatbane ... 171
Goat's-beard ... 104
Goat's Rue ... 94
Golden Alexanders ... 138
Golden Bartonia ... 128
Golden-chain ... 91
Golden Club ... 318
Golden Fern ... 368
Goldenrod ... 166
Goldthread ... 21
Good-king-Henry ... 286
Good-night ... 260
Gooseberry ... 117
Goosefoot ... 285
GOOSEFOOTS ... 284
Goosegrass ... 107, 148
Gourd ... 130
GRAMINOIDS ... 355
Grape ... 77
Grape Fern ... 366
Grape Hyacinth ... 344
GRASSES ... 356
Grass of Parnassus ... 115
Grass Pink ... 330
Grass-poly ... 123
Greek Valerian ... 257
Green Brier ... 328
Green Dragon ... 318
Green-head ... 150
Green Violet ... 45
Gromwell ... 252
Ground Cherry ... 263
Ground Fir ... 362
Ground Pine ... 362
Ground Ivy ... 245
Ground-nut ... 96, 142
Groundsel ... 187
Groundsel-tree ... 171
Guava ... 122
Gum-tree ... (120) 143
GYMNOSPERMS ... 311
Hair Grass ... 358
Hardhack ... 103
Hare-bell ... 196
Hart's-foot ... 91, 371
Hart's-tongue ... 373
Haw ... (146, 147) 111
Hawthorn ... 110, 111
Hawkweed ... 191
Hazelnut ... 307
Heart's-ease ... 47
Heart-seed ... 75
Heath, Heather ... 200
HEATHWORTS ... 197
Hedgehog ... 92
Hedgehog Grass ... 358
Hedge Hyssop ... 227, 245
Hedge Mustard ... 39
Hedge Nettle ... 248
Hedge Bindweed ... 283
Heliotrope ... 250
Hellebore ... (348) 21
Hemlock ... (139, 141) 313
Hemp ... (289) 301
Hemp Nettle ... 248
Henbane ... 264
Henbit ... 248
Herb Robert ... 68
Hercules' Club ... 142
Herd's Grass ... 358
Heron's-bill ... 68
Hickory ... 304
High Cranberry ... 146
High-water Shrub ... 174
HIPPURIDS ... 120
Hoarhound ... (159, 248) 249
Hobble-bush ... 146
Hogweed ... 174
HOLLYWORTS, Holly ... 207
Hollyhock ... 60
Honesty ... 40
Honewort ... 138
Honey Locust ... 83
Honeysuckle ... 144-6
HONEYSUCKLES ... 144
Hoop-petticoat ... 333
Hop ... 301
Hop Hornbeam ... 307
Hornbeam ... 307
Horn Pondweed ... 321
Horn Poppy ... 39
HORNWORTS ... 302
Horse Balm ... 241
Horse Chestnut ... 74
Horsemint ... 240, 245
Horse Nettle ... 263
Horse Radish ... 41
Horse-tail ... 363
Horse-weed ... 174
Hound's-tongue ... 251
Houseleek ... 119
HOUSELEEKS ... 117
Huckleberry ... 198
Hyacinth ... 344
Hydrangea ... 116
HYDROPHYLLS ... 253
Hyssop ... (227, 245) 241
Immortal-flower ... 186
Indian Corn ... 359
Indian Cress ... 69
Indian Cucumber-root ... 340
INDIAN FIGS ... 131
Indian Mallow ... 61
Indian Millet ... 357

Indian Physic 104
Indian Pipe 206
Indian Rice 357
Indian Shot 332
Indian Tobacco 195
Indian Turnip 318
India-rubber tree 299
India Wheat 284
Indigo Plant (84) 95
Inkberry 208
Innocence 149, 225
IRIDS 336
Ironweed 155
Ironwood 307
Ivy (73, 188) 142
Ivy, Poison 73
Jack-in-the-pulpit 318
Jacobæa 187
Jacobæa Lily 334
Japan Globe-flower 104
Japan Quince 112
Japan Rose 65
Japonica 65
Jersey Tea 77
Jerusalem Artichoke 177
Jerusalem Cherry 262
Jerusalem Sage 248
Jessamine (269, 392) 275
Jewelweed 69
Jimson-weed 265
Job's-tears 359
Jonquil 333
Judas-tree 83
July-flower 38
June Grass 358
Juniper 314
Kidney Bean 96
Knap-weed 188
Knawel 58
Knot Bindweed 283
Knotgrass 282
Labrador Tea 204
Lady-Fern 372, 374
Lady's Eardrop 127
Lady's Mantle 108
Lady's Slipper 326
Lady's Tresses 329
Lamb Lettuce 151
Larch 314
Larkspur 22
Laurel 24, 102, 200
LAURELS 290
Laurestine 147
Lavender 239
Lead Plant 93
Leadwort 215
LEADWORTS 214
Leaf-cup 172
Leather-flower 17
Leather-leaf 202
Leather-wood 292
Leek 344
LEGUMINOUS PLANTS 80
Lemon 71
Lentil 100
Lettuce (151, 192,) 193
Leverwood 307
Lignum-vitæ 67
Lilac 276
Lily (333-4, 337, 345,) 342
Lily-of-the-valley 346
LILYWORTS 341
Lime 71
Lime-tree (143) 64
Linden 64
LINDENBLOOMS 64
Lion's-ears 249
Lion's-foot 192
Lion's-heart 247
Lip Fern 370
Liquorice 148
Live-forever 118, 119
Liver-leaf, Liverwort 18
Lizard-tail 301
LOASADS 128
LOBELIADS 194
Loblolly Bay 65
Locust (83) 95
Long Moss 335
Loosestrife 212
LOOSESTRIFES 123
Lopseed 236
LORANTHS 291
Lousewort 232
Lovage 140
Love-lies-bleeding 289
Lucerne 92
Lungwort 253
Lupine 90
Lychnidea 256
Madder (283) 148
MADDERWORTS 147
Mad-dog Skull-cap 247
Madwort 40
MAGNOLIADS 24
Mahogany 66
Maidenhair 370
Maize 359
Mallow 60–62
MALLOWS 59
Mangel-wurzel 285
Manna Grass 358
Maple 74
MAPLEWORTS 73
Mare's-tail 121
Marigold (21) 188
Marjoram 242
Marsh Cress 36
Marsh Elder 174
Marsh Mallow 60
Marsh Marigold 21
Marsh Rosemary 215
Marvel-of-Peru 279
MARVELWORTS 279
MASTWORTS 304
Matrimony-vine 264
May Apple 28
May-flower 200
May-weed 183
Meadow-Rue 18
Meadow-sweet 104
Medick 92
MELANTHS 347
MELASTOMES 122
Melic Grass 358
Melilot 92
MENISPERMADS 26
Mercury 296
Mermaid 68
Mermaid-weed 120
MESEMBRYANTHS 133
Mexican Tea 286
Mexican-vine 285
Miami-mist 255
MIGNONETTES 44
Milkweed 272
Milkworts 78
Milk Vetch 94
Millet 358
Millfoil (121) 183
Mint (183, 245) 240
Mistletoe 291
Mitrewort 113
Mockernut 304
Mock-Orange 116
Molucca Balm 248
Moneywort 212
Monkey-flower 226
Monk's-hood 22
Moon-seed 26
Moonwort 366
Morello 102
Morning-glory 259
Moss Campion 53
Moss Pink 257
Mother Carey 183
Motherwort 249
Moth Mullein 222
Mountain Ash 112
Mountain Fringe 33
Mountain Heath 201
Mountain Mint 245
Mountain Sorrel 280
Mourning Bride 152
Mouse-ear Chickweed 54
Mouse-tail 20
Moving-plant 89
Mud Purslane 51
Mudwort 228
Mugwort 184
Mulberry (105, 236, 299) 300
Mullein 222
Mullein Pink 54
Muscadine 78
Musk Melon 131
Musk-plant 226
Mustard (36, 39) 40
Myrtle (123, 204, 309) 122
MYRTLEBLOOMS 121
NAIADS 320
Nailwort 57
Narcissus 332
Nasturtion 69
Navelwort 251
Neapolitan 47
Neckweed 229
Nectarine 103
Nelumbo 29
Nettle (248, 263, 296) 300
Nettle-tree 299
NETTLEWORTS 298
New York Fern 374
Nightshade (128, 264) 262
NIGHTSHADES 261
Ninebark 103
Nipplewort 190
Noisette 110
Nonesuch 92
Nutmeg-flower 21
NYMPHIADS 28
Oak 305
Oak, Poison 73
Oak-of-Jerusalem 286
Oat (347) 358
Ogeechee Lime 143
Okra 63
Oil-nut 292
Oil-seed 219
Oleander 271

Oleaster 292
Olive 276
OLIVEWORTS 275
ONAGRADS 124
Onion 343
Opium Poppy 32
Orache 287
Orange (116, 299) 71
ORANGEWORTS 71
ORCHIDS 325
Orris-root 337
Osage Orange 299
Osier (143) 309
Ostrich Fern 369
Oxeye (171) 175
Oxheart 102
Pæony 23
Painted-cup 232
Palmetto 317
PALMS 316
Pampas Grass 359
Panic Grass 358
Pansy 45
Paper Mulberry 299
Pappoose-root 28
Parsley 138
Parsley-piert 108
Parsnip (141) 137
Partridge-berry 148
Pasque-flower 17
Passion-flower 129
PASSIONWORTS 129
Pawpaw 26
Pea (83, 86) 85
Peach 103
Peanut 87
Pear 112
Pearlwort 56
Pea-vine 97
Pecan-nut 304
Pellitory 301
Pencil-flower 87
Pennyroyal (239) 241
Pennywort 135, 268
Pepper 263
Pepper-and-Salt 140
Pepper-bush 204
Pepper-grass 42
Peppermint 240
PEPPERWORTS 360
Periwinkle 270
Persimmon 209
Pettimorrel 142
Pheasant's-eye 19, 52
Phlox (39) 256
PHLOXWORTS 256
Pickerel-weed 350
Pie-plant 281
Pigmy-weed 118
Pignut 304
Pigweed (289) 285
Pimpernel 213
Pine 312
Pineapple 335
Pine-sap 206
Pink (54, 203, 257, 330) 52
Pink-root 269
PINKWORTS 52
Pinweed 47
Pinxter-bloom 203
Pipes 364
Pipewood 202
Pipeworts 355
Pipsessiwa 206
Pitcher-plant 30
Plane-tree 303
Plantain (323, 330) 213
Plum 101
Plume Grass 359
Poet's Narcissus 333
Poison Haw 146
Poison Hemlock 139
Poison Ivy 73
Poison Oak 73
Poke 284
Pokeworts 284
Polar-plant 173
Polypody (373) 368
Pomegranate 123
Pond Lily 29
Pond Spice 291
Pond-weed 321
PONTEDERIADS 350
Poor-man's-weather-glass 213
Poplar 311
Poppy 32
POPPYWORTS 31
Possum Haw 147
Potato (259) 262
Poverty Grass 858
Prairie Burdock 173
Prairie Queen 109
Prickly Ash 70
Prickly Pear 132
Prickly Poppy 32
Pride-of-India 65
Pride-of-Ohio 211
Pride-of-the-Meadow 104
Prim 276
Primrose (125) 211
Primrose-peerless 333
Primworts 210
Prince's-feather 283, 278
Prince's Pine 206
Privet 276
Puccoon 252
Pumpkin 130
Purple Cone-flower 175
Purple Jacobæa 187
Purslane (51, 127, 133) 59
PURSLANES 58
Putty-root 328
Quake Grass 358
Quamash 343
Quassia 72
QUASSIAWORTS 71
Queen-of-the-Prairie 104
Quillwort 360
Quince 112
Radish 43
Ragged Lady 21
Ram's-head 326
Raspberry 105
Rattle-pod 90
Rattlesnake Fern 366
Rattlesnake Plantain 330
Red Bay 290
Red-bud 83
Red Osier 143
Red Pepper 263
Red-root (77) 335
Redtop 357
Red-wood 315
Reed (357) 358
Reed-mace 320
Resurrection Moss 363
Rheumatism-root 28
Rhubarb 281
RIBWORTS 213
Rice 357
Richweed 300
Riverweed 302
Robin's Plantain 165
Rock Cress 37
Rocket (36, 43) 39
Rock Polypod 373
ROCK ROSES, Rock Rose 47
Roman Wormwood 184
Rose (21, 105) 108
Rose Acacia 95
Rose Apple 122
Rose Bay 124, 203
Rose Campion 54
Rosemary (202, 215, 303) 244
ROSEWORTS 101
Rosin-weed 172
Rue (18, 94, 372) 70
Rue Anemone (20) 18
RUEWORTS 70
Rush 356, 363
Rushes 350
Rutland Beauty 260
Rye 359
Saffron 189, 337
Sage 248, 244
Saltwort 212, 287, 288
Samphire 287
SANDALWORTS 291
Sand-hill Rosemary 303
Sand Myrtle 204
Sand Orache 287
Sand Reed 358
Sand Spurry 57
Sandwort 55
Sanicle 135
Sarsaparilla 142, 338
Sassafras 290
Satin-flower 41
SAURURADS 301
Savory 242
Saxifrage 113
SAXIFRAGES 112
Scabish 152, 182
Scarcity 285
Scorpion Senna 87
Scotch Broom 100
Scouring Rush 363
Scratch-grass 284
Screw-stem 268
Scuppernong 78
Scurvy-grass 39
Sea Aster 164
Sea Oxeye 171
Sea Purslane 133
Sea Rocket 43
Sea Wormwood 185
Sea-wrack 321
SEDGES, Sedge 355, 356
Seed-box 127
Self-heal 246
Seneca Snakeroot 79
Senna (87, 95) 83
Sensitive Brier 82
Sensitive Fern 369
Sensitive Pea 83
Sensitive Plant 82
Serpent Cucumber 131
Service-tree 110
Sesame Grass 359

Shaddock-tree 71
Shad-flower 110
Shagbark 304
Shamrock 91
Sheep-poison 200
Sheep Sorrel 281
Shell-flower 248
Shepherd's-purse 42
Shield Fern 373
Shrub Trefoil 71
Sickle-pod 37
Sidesaddle-flower 30
Silk Cottons 63
Silk-tree 82
Silk-weed 272
Silver-berry 292
Silver Fern 368
Silver-weed 107
Single-seed Cucumber 130
Skullcap 246
Skunk Cabbage 318
Sloe 147
Slipper-flower 222
Smartweed 283
Smoke-tree 73
Smooth Lungwort 253
Snails 92
Snake-head 224
Snake-root 23, 79, 192, 278
Snapdragon 223
Snapdragon Catchfly 53
Sneezewort 183
Snowball 146
Snowberry 144
Snowdrop 334
Snowdrop-tree 209
Snow-flake 334
Soapberry 75
Soapwort 53
SOAPWORTS 210
Soft Grass 358
Solomon's Seal 346
Sorrel (67) 281
Sorrel-tree 203
SORRELWORTS 280
Southernwood 184
Sow-Thistle 194
Spanish-daggers 345
Spanish-needles 180
Spear Grass 358
Spearmint 240
Spearwort 19
Speedwell 229
Spice-wood 290, 291
Spider-flower 44
SPIDERWORTS 353
Spinach, Spinage 287
Spleenwort (133) 372
Sponge-tree 99
Spoonwood 200
Spring-beauty 59
Spruce 313
Spurge 293
Spurge Nettle 296
SPURGEWORTS 293
Spurry 57
Squash 130
Squaw-root 217
Squill 343
Squirrel Corn 33
Staff-tree 76
STAFF-TREES 75
Stagger-bush 202
Standing Cypress 257
Staghorn Fern 367
St. Andrew's Cross 48
Star Anise 24
Star-of-Bethlehem 343
Star-grass 334, 335
Star Thistle 189
STARWORTS 301
St. John's-wort 49
ST. JOHN'S-WORTS 48
Stock 38
Stone-crop 118, 119
Stork's-bill 68
St. Peter's-wort 48
St. Peter's-wreath 103
Strawberry (107) 106
Strawberry Blite 286
Strawberry Tomato 263
Succory (Chicory) 190
Sugar-berry 299
Sugar Cane 359
Sugar-tree (Maple) 74
SUMACS, Sumac 72
Summer Savory 242
SUNDEWS, Sundew 50
Sunflower 176
Supple Jack 77
Swamp Laurel 200
Swamp Pink 203
Sweet Basil 238
Sweet Brier 109
Sweet Cicely 137
Sweet Fern 309
Sweet Flag 318
Sweet Gale 309
Sweet Gum 120
Sweet Pea 86
Sweet Pepperbush 204
Sweet Potato 259
Sweet Reed 357
Sweet-scented Clover 92
Sweet-scented Shrub 25
Sweet Sultan 189
Sweet Vernal Grass 358
Sweet Viburnum 147
Sweet William 52
Swine Cress 43
Sycamore 74, 303
SYCAMORES 303
Tacmehac 311
Tallow-tree 296
Tamarac 314
TAMARISKS 63
Tansy 39
Tansy Mustard 39
Tares 86
Tassel-flower 186
Tassel-tree 62
Tea (77, 214, 286) 65
TEAWORTS, Tea-Rose 64, 65
TEASELWORTS, Teasel 151
Thimbleberry 105
Thistle 189
Thorn 110
Thorn Apple 265
Thoroughwax 138
Thoroughwort 159
Threadfoot 302
THREADFOOTS 302
Three-birds 223, 330
Three-seed Mercury 296
Thrift 215
Thyme 243
Tick-seed 178
Tiger-flower 337
Timothy 358
Toad Flax (291) 222
Tobacco (195) 265
Tomato (363) 362
Tongue-grass 43
Toothache Grass 359
Touch-me-not 69
Touch-wood 72
Tower Mustard 36
Trailing Arbutus 200
Tree Fern 367
Tree Hibiscus 63
Tree of Heaven 72
Tree Orchis 331
Trefoil 71, 88
TRILLIADS 340
Trumpet-flower 218
Trumpet-leaf 30
Trumpet Milkweed 193
Trumpet-tongue 221
Trumpet-weed 159
Tuberose 334
Tulip 341
Tulip-tree 25
Turk's-cap 342
Turmeric-root 23
Turnip 40
Turnip Beet 285
Turtle-head 224
Twayblade 329
Twin-flower 144
Twin-leaf 28
Twist-foot 347
TYPHADS 319
UMBELWORTS 133
Umbrella-leaf 28
Umbrella-tree 25
Unicorn-plant 219
Valerian (257) 150
Vanilla-plant 157
Vegetable Marrow 130
Vegetable Oyster 191
Venus' Comb 137
Venus' Flytrap 50
Venus' Looking-glass 197
Vervain 235
Vetch (94, 100) 86
Victoria Lily 30
VINES 77
VIOLETS, Violet (105) 45
Viper's Bugloss 251
Virginia Creeper 78
Virginia Lass 109
Virginia Snakeroot 278
Virginia Stonecrop 119
Virgin's-bower 16
Wake Robin 340
Walking Fern 372
Wall-flower (39) 38
Wall Rue 372
Walnut 304
WALNUTS 303
Water-carpet 113
Water Cress 36
Water-feather 211
Water Hemlock 141
Water Hemp 289
Water Hoarhound 241
Water-leaf 254
Water Lily 29
Water Melon 130

Water Milfoil 121
Water Nymph 320
Water Parsnip 141
Water Pepper 283
WATER PEPPERS 51
Water Pimpernel 213
WATER PITCHERS 30
WATER PLANTAINS 322
Water Plantain 323
Water Purslane 127
Water Smartweed 283
Water Target 29
Wax-plant 275
Whahoo 299
Wheat 359
Wheat-thief 253
Whistlewood 74
White Bay 24
White Lettuce 192
White-tipped Aster 160
Whiteweed 165, 193
Whitewood 25
Whitlow-grass 41
Wild Basil 243
Wild Bergamot 243
Wild Bugloss 251
Wild Elder 142
Wild Foxglove 230
Wild Ginger 278
Wild Indigo 84
Wild Liquorice 148
Wild Oats 347
Wild Pink 54
Wild Potato 259
Wild Rosemary 202
Wild Sarsaparilla 142
Wild Sensitive-plant 83
Wild Service 110
Willow 309
Willow-herb 124
WILLOW-WORTS 309
Wind-flower 17
Winter-berry 208
Winter Cress 39
Winter-green 201, 205
Witch Grass 359
Witch Hazel 120
WITCH HAZELWORTS, 120
Woad 43
Woad-waxen 90
Wolfbane 22
Wolfberry 145
Woodbine 145
Wood Cress 36
Wood Nettle 300
Wood Sorrel 67
Woolmouth 230
Worm-seed 286
Wormwood 184
XYRIDS 354
Yam 338
Yarrow 183
Yellow-eyed Grass 354
Yellow Jessamine 269
Yellow Phlox 39
Yellow Pond-lily 29
Yellow Poppy 32
Yellow Rattle 232
Yellow-root 21
Yellow-seed 43
Yellow Sweet Sultan 189
Yellow-wood 84
Yew 316
YEWS 315
Yulan 25
Zigadine 348
Zizia 139

ADDENDA.

After G. album, page 106, add,

β. *luteum.* A variety with yellow flowers rarely occurs in Pennsylvania.

After C. (Cratægus) spatulata, page 111, insert—

10a **C. Pyracántha** Pers. Shrub 10f, thorny; lvs. evergreen, lance-ovate or oblong, crenulate-serrate, smooth and shining. § Near Philadelphia, and southward.

On page 175, after E. (Echinàcea) atrorubens, add,

4 **E. Pórteri** (Gray). Leaves lanceolate to lance-linear, remotely toothed, the highest entire; heads corymbed, 1′ broad; scales about 9, lance-linear; rays 6—8, ovate-lanceolate, *yellow;* chaff *spinescent.* Stone Mountain, Ga. (Prof. Porter). Has the habit of Rudbeckia, but its chaff is plainly that of Echinacea.

On page 190, before Lappa, may be inserted—

99a. **CÁRDUUS** NUTANS, L. Bristles of the pappus *not plumous*, nearly naked. Stem 2f, slender; lvs. narrow, sinuate-spinescent, decurrent, 2—3′. Heads few, large, nodding, purple. Ach. linear-oblong, rugulous, 2″, crowned with a many-bristled deciduous pappus three-quarters of an inch long. Harrisburg, Pa. (Prof. Porter). § Eur.

Page 208, after P. (Prinos) lævigatus, add,

4a **P. pubéscens** Mx. Shrub 6—8f, with smooth, virgate branches; lvs. large, ovate, acuminate, serrulate, soft pubescent beneath; clusters umbellate, axillary, shorter than the petioles; berries dark red, 2—3″ in diameter. Alleghanies, Pa.

Page 146, after D. (Diervilla) sessilifolia, add,

4 **D.** JAPÓNICA, β. ROSEA. *Wiegela.* Shrub from Japan, 4—6f, with straight branches; lvs. oblong-ovate, acuminate, large; flowers funnelform, rose-colored, 1′ broad, covering the plant in Spring; ovaries and pods linear. Common in cultivation.

Page 150, after Bouvardia, add,

11. **GARDÈNIA** FLÓRIDA. *Cape Jessamine.* From China. Much cultivated South. Shrubby evergreen, 2-4f. Lvs. elliptical, acute both ways, very smooth. Flowers white, corolla 5-lobed or often many-lobed and double, salverform, 2′ broad.

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